

A SEMI-ANNUAL AQUATIC MONITORING REPORT FOR A SURFACE MINE PERMIT (DMLR # 1101760) LOCATED NEAR ROARING FORK IN WISE COUNTY, VIRGINIA

Prepared for: Red River Coal Company, Inc

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ATS PROJECT NO. 1199.01

October 2013

I. INTRODUCTION

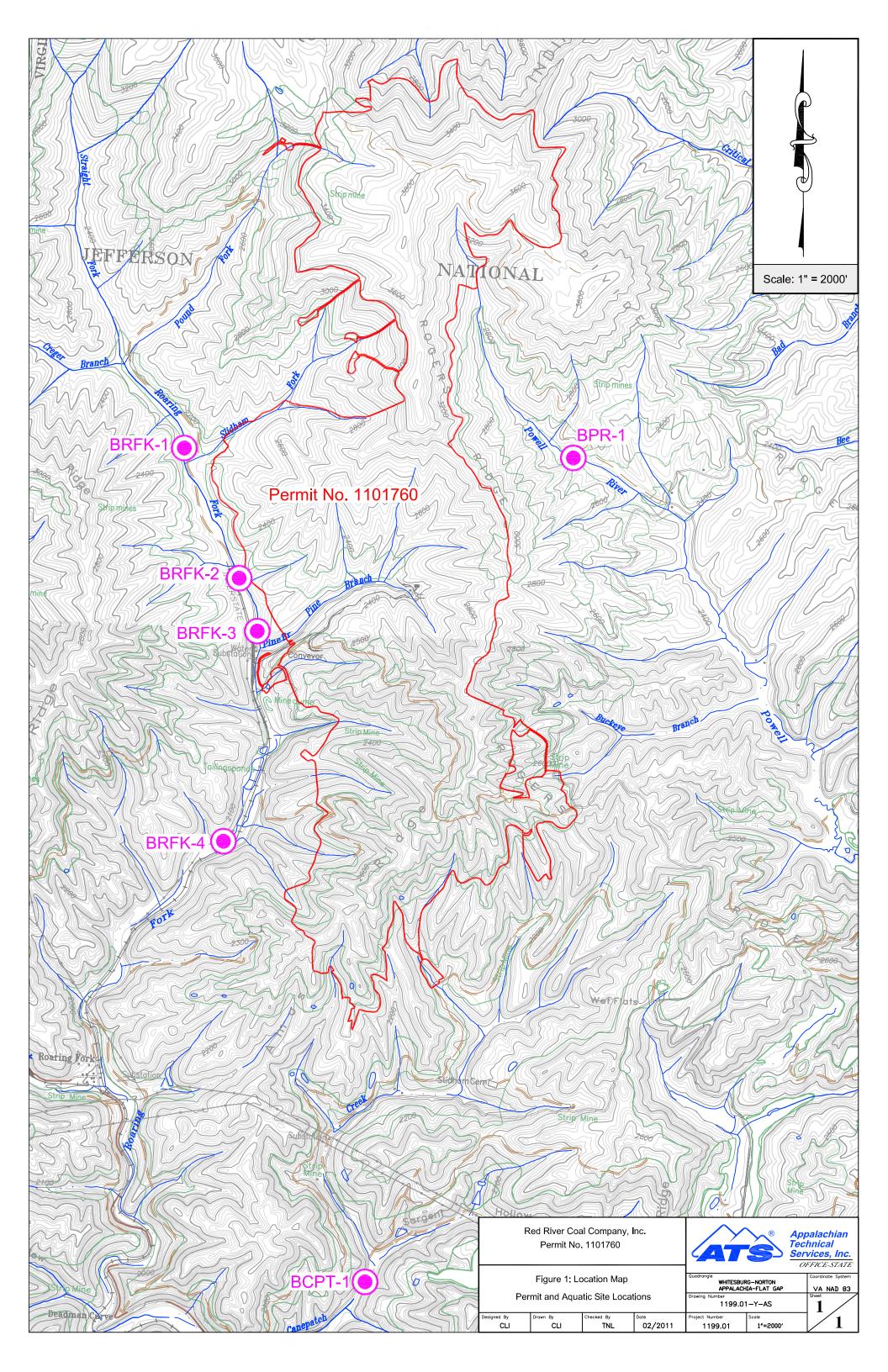
Appalachian Technical Services, Inc. was contracted by Red River Coal Company, Inc to conduct ongoing semi-annual (spring and fall) aquatic monitoring at six sites near Roaring Fork in Wise County, Virginia. This report represents the fall 2013 aquatic biological assessments of six sample sites. The permit boundary and sample site locations are shown on the attached topographical map in Figure 1.

II. METHODS

General locations of all sample sites were selected by a Virginia DMLR biologist. However, the exact site locations may have been relocated by ATS senior biologists due to site conditions (*i.e.* low flow, lack of riffle habitat, etc.) and accessibility. Aquatic sampling site BRFK-1 was located on Roaring Fork approximately 50 m upstream of the confluence with Stidham Fork (37.01201; 82.72937). Aquatic sampling site BRFK-2 was located on Roaring Fork approximately 400 m upstream of sample site BFRK-3 (37.00596; 82.72571). Aquatic sampling site BRFK-3 was located on Roaring Fork approximately 50 m upstream of the confluence to Pine Branch (37.00011; 82.72237). Aquatic sampling site BRFK-4 was located southeast of the permit on Roaring Fork approximately 450 m downstream of a series of sediment ponds (39.98557; 82.72422). Aquatic sampling site BCPT-1 was southeast of the permit and located on Canepatch Creek approximately 100 m downstream of the confluence to Sargent Hollow (36.95584; 82.71094). Aquatic sampling site BPR-1 was located to the east of the permit boundary in the upper headwaters of the Powell River approximately 50 m upstream of Red River Coal Company's haulroad (37.01277; 82.69608).

Data collections for the aquatic monitoring consisting of habitat data, macroinvertebrates, grab sample and physiochemical water quality data were collected on 05 and 06 September 2013 by ATS Biological Technicians James Breeding and Brian Bledsoe.





A. Habitat Assessments

Rapid Bioassessment Protocol (RBP) high gradient data sheets were used to assess the habitat for each stream. The RBP sheets score each site's habitat based on 10 criteria with 1 - 20 possible points each (for a max total of 200). Based on the 2008 Methods for Assessing Biological Integrity of Surface Waters in Kentucky, Revision 3 (KDOW 2008), stream habitat in the central Appalachians Ecoregion is considered not supporting its designated use if the total score is less than or equal to 116 total points. Habitat must score 117 – 159 to achieve a partially supporting criterion. To qualify as fully supporting habitat, it must score at least 160 total points. Copies of the stream habitat data sheets are attached in Appendix A.

B. Aquatic Macroinvertebrates

Macroinvertebrates were collected using the single habitat approach as described in sections 7.1.1 and 7.3.1 of the Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition (Barbour et al. 1999).

Macroinvertebrates were collected by agitating a riffle area of 0.25 meters in front of a standard size (500 Φ m mesh) kicknet. This process was repeated eight times to achieve 2 square meters of sample area. Upon collection, samples from each site were placed in individual containers of 95% ethyl alcohol, labeled, and returned to the lab.

Subsampling procedures followed methods within Appalachian Technical Services, Inc.'s Virginia Department of Environmental Quality approved *Quality Assurance Project Plan for Biological Monitoring, 2010* and resulted in the identification of approximately 110 (±10%) individuals. All macroinvertebrates were identified by a North American Benthological Society certified taxonomist to family level with the exception of Chironomidae and Oligochaeta.



Macroinvertebrate metrics were calculated based on the methods included in A Stream Condition Index for Virginia Non-Coastal Streams (Tetra Tech, Inc. 2003). ATS biologists used the Ecological Data Application System (EDAS) to statistically rarify the samples to 110 organisms and calculate VSCI scores. The VSCI is used to compare streams to reference conditions to evaluate a streams current health. A stream must score a 61 or above to qualify as acceptable water quality. In order to calculate the VSCI the following metrics were calculated from the family level aquatic macroinvertebrate data: Taxa richness; Ephemeroptera, Plecoptera, Trichoptera (EPT) Index: Percent Ephemeroptera; Percent Plecoptera Trichoptera (less Hydropsychidae); Percent Scrapers; Percent Chironomidae; Percent of top two dominant families; and Family Biotic Index (FBI). Tables with the macroinvertebrate data are attached in Appendix B.

C. Physiochemical Water Data

Prior to any field data collections, all handheld meters were calibrated. Four water quality parameters (specific conductance, dissolved oxygen, pH, and temperature) were analyzed using a handheld meter (YSI Pro Plus). Upon return to the lab all meters received a post-calibration check to ensure validity of all measurements recorded.

In addition to handheld meters, a surface water grab sample was collected at each sample site and delivered to Environmental Monitoring Inc. for analysis. Parameters analyzed were Acidity, Alkalinity (Bicarbonate), Alkalinity (Carbonate), Total Alkalinity, Hardness, Total Iron, Total Manganese, Nitrate, Nitrite, Total Cyanide, Total Dissolved Solids, Total Phenols, Total Suspended Solids, Total Boron, Total Magnesium, Total Aluminum, Total Antimony, Total Arsenic, Total Barium, Total Beryllium, Total Cadmium, Total Chromium, Total Cobalt, Total Copper, Total Lead, Total Nickel, Total Selenium, Total Silver, Total Thallium, Total Zinc, Total Mercury,



Chloride, Sulfate, and Dissolved Organic Carbon. Grab sample analysis data can be found in Appendix C.

III. RESULTS

A. Habitat Assessments

The stream habitat at BRFK-1 scored 139 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 25 feet wide and characterized mostly by a series of riffles and runs (Figures 2 and 3). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The water was clear but there was moderate deposition of sediment within the streambed. The stream banks were moderately stable and with good riparian zones.

The stream habitat at BRFK-2 scored 130 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 4 and 5). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The water was clear but there was moderate deposition of sediment within the streambed. The stream banks were moderately stable but the right bank had a narrow riparian zone.

The stream habitat at BRFK-3 scored 130 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 6 and 7). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear and there was evidence of slight siltation within the streambed. The stream banks were moderately stable but the right bank had a narrow riparian zone.



The stream habitat at BRFK-4 scored 144 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 25 feet wide and characterized mostly by a series of riffles and runs (Figures 8 and 9). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate sedimentation within the streambed. Both stream banks had suboptimal vegetation and good riparian zones.

The stream habitat at BCPT-1 scored 128 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 15 feet wide and characterized mostly by a series of riffles and runs (Figures 10 and 11). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate sedimentation within the streambed. The stream banks were moderately unstable and with good riparian zones.

The stream habitat at BPR-1 scored 139 of 200 (Appendix A), indicating the habitat is partially supporting its designated use. The stream was approximately 4 feet wide and characterized mostly by a series of runs and riffles (Figures 12 and 13). Flow occupied >75% of the stream channel. Embeddedness was suboptimal with approximately 25 to 50% of the substrate particles surrounded by fine sediment. The coloration of the water was clear but there was evidence of moderate deposition of sediment within the streambed. The stream banks were unstable but with good riparian areas.

B. Macroinvertebrates

Sample sites BRFK-2 and BCPT-1 had the highest Taxa Richness (Tables 1 and 2). Sample site BRFK-1 had the lowest Taxa Richness (Tables 1 and 2). Sample site



BPR-1 had the lowest FBI score (1.93), indicating excellent water quality with organic pollution unlikely (Table 2). FBI scores for the six sample sites indicated fairly poor (5.87) to excellent (1.93) water quality (Table 2). VSCI scores for the six aquatic sample sites ranged from a low of 28.19 (BRFK-3) to a high of 56.91 (BPR-1) (Table 2).

C. Physiochemical Water Data

All handheld meters passed post-calibration tests. Specific conductances for the six sites ranged from 910 μ S (BPR-1) to 1316 μ S (BRFK-2) (Table 3). The results of the water chemistry samples for each site are attached in Appendix C. All other parameters recorded appeared to be within normal limits.

IV. CONCLUSION

Based on RBP habitat data, all six sample sites appear to be somewhat impaired. Habitat assessments revealed that the habitat was marginal to suboptimal at all six sample sites. All six sample sites had a VSCI score below the unimpaired threshold of 61. All the sample sites had low; Taxa Richness, EPT Richness, percent Ephemeroptera, percent PT-Hydropsychidae, percent scrapers, and high percent two dominants. These low parameter indices may have contributed to the sample sites receiving poor VSCI scores. All water parameters recorded with a handheld meter appeared to be within normal limits with an exception of elevated specific conductances at all six sample sites.





Figure 2: BRFK-1 upstream view



Figure 3: BRFK-1 downstream view



Figure 4: BRFK-2 upstream view



Figure 5: BRFK-2 downstream view



Figure 6: BRFK-3 upstream view



Figure 7: BRFK-3 downstream view



Figure 8: BRFK-4 upstream view



Figure 9: BRFK-4 downstream view



Figure 10: BCPT-1 upstream view



Figure 11: BCPT-1 downstream view



Figure 12: BPR-1 upstream view



Figure 13: BPR-1 downstream view

Literature Cited

- Barbour, M. T., J. Gerritsen, B. D. Snyder, and J. B. Stribling. 1999. Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates and Fish, Second Edition. EPA 841-B-99-002. U.S. Environmental Protection Agency; Office of Water; Washington, D.C.
- Kentucky Division of Water (KDOW), 2008. Methods for assessing biological integrity of surface waters in Kentucky, Revision 3. Kentucky Department of Environmental Protection, Division of Water, Frankfort, Kentucky.
- Tetra Tech, Inc. 2003. A Stream Condition Index for Virginia Non-Coastal Streams. Tetra Tech, Inc. Owings Mills, Maryland. Prepared for Virginia Department of Environmental Quality, Richmond, Virginia.

APPENDIX A:

RBP DATA



Benthic Wacroinvertebrate Field Data Sheet (front) Station ID: [199.01 - BRFK] Ecoregion: Land: Use	
Field Team: SEB, BWB Survey Reason: Bio. Monitoring Start Time: 14:	20
Stream Name: Rearing Fork Location: 25m upstream of Finish Time: 14 pond discharge	: <u>40</u>
Date: 9/5/13 Latitude: 37.01200 Longitude: 82.72948 Stream Physicochemical	:
Instrument ID number: VSI-66486 Temperature: 17.9 Go Conductivity: Wilcon 1244 Dissolved Oxygen: 8.12 mg/l Did înstrument pass all post-calibration checks? Y/N If NO - which parameter(s) failed and action	
Benthic Wacroinvertebrate Collection	
Metho d'used (circle one) Single Habitat (Rille) Multi Habitat (Legs, plenis, etc) Riffic Quality (circle one) Good Marginal Poor None Habitats sampled (circle one) Riffie Snags Banks Vegelation Area Sampled (s #Jabs	q.m.j: 2~2
Weather Observations Current Weather (circle one) Gloudy Clear Rajn/Snow Foggy Recent precipitation (circle one) Glead Showers Rain Storms Other Stream flow (circle one) Low Normal Above Normal Flood INSTREAM WATERSHED INS	
Stream Width 26 ft Range of Depth 100 ft O Surface Mining O Construction Average Velocity ft/s O Deep Mining O Commercial OF Pasture/Grazing Discharge CS O Oil Wells O Industrial OF Silviculture Est, Reach Length 100 O Land Disposal O Row Crops O Urban Runoff/Storr	n Sewera
Hydraulic Structures: 9 Dams 9 Bridge Abutments 9 Dry 9 Pooled 9 Low Normal 9 Perennial 9 Inland 9 Waterfalls 9 High 9 Very Rapid or Torrential 9 Eplacmeral 9 Se	
Riparian Vegetation: Dom. Tree/Shrub Taxa Canopy Cover: Channel Alterations: Dominate Type: Fully Shaded (75-100%) O Trees Shrubs O Grasses Herbaceous Number of strata OFully Exposed (0-25%) OFully Exposed (0-25%)	
Substrate OEst, OP.C. Riffle 30 % Run 20 % Pool 5 %	1
In a substitution of stable in the form of new potential (i.e. logs/snags in the not new fold and not framisent). HighGradient Habitat Data Sheet Suboptimal Suboptimal Marginal Poor 1. Epifaurial Greater then 70% of substrate 40-70% m/s of stable inabitat; 20-40% m/x of stable 40-70% m/s of stable inabitat; 20-40% m/x of stab	
SCORE 20 19 18 17 16 2. Embeddedness Optimal Gravel, cobble, and boulder particles are 0- 25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 3. Velocity/Depth Optimal Suboptimal Marginal Poor Regime CoverAll four velocity/depth regimes present (if fast-shallow is missing, score lower satisfies, score lower than If missing other regimes). SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	
000112 20 10 11 10 10 11 10 12 11 10 10 10 10 10 10 10 10 10 10 10 10	

SCORE RB 10 9

11-11.01-6	MEID	•		
'4. Sediment Deposition SCOF	Optimal Little or no enlarge of Islands or point and less than 5% for I; ov-gradient streams) of the bot affected by sedime deposition.	t bars bur formellon, mo (<20% from gravel, sand fire sediment, 5-3). So % for low-gradie the boltom affecte slight deposition in pools.	sily new gravel, sand or f or sediment on old and 0% (20- new bars; 30-50% (50 new bars; 30-50% (50 d; 1;	ine material, increased bar development; infore than 50% (80% for low- of gradient) of the bottom changing frequently; pools almost absent.
	20 19 18 17 m/s.	16 15 14 13 (2)	11 10 9 8 7 6	5 4 3 2 1
5, Channel Flow Status	Optimal Water reaches base both lower banks, a minimal amount of channel substrate is exposed.	and available channel; 4 25% of channel s. substrate is expose	or avallable channel, and/or riffle substrates d. are mostly exposed.	channel and mostly present as slandling pools.
SGOR 6, Channel Alferation		Suboptimal Suboptimal Some channelization present, usually in a bridge abutemen eyidence of past channelization, i.e., dredging, (greater th past 20 yr.) may be present, but recent channelization is not present.	Marginal Channelization may be reas extensive; embankment is; or storing structures present on both banks; and 40 - 80% of stream erreach channelized and disrupted.	5 4 3 2 1 Poor Poor Banks shored with s gablon or cement over 80% of the stream reach channelized and disrupted, instream habitat greatly aftered or removed entirely,
the state of the s	20 19 18 17 16	15 (4) 13 12 11	10 9 8 7 6	5 4 3 2 1
	Occurrence of riffles relatively frequent rail of distance biw. riffled divided by width of the stream 47:1 generally to 7); variety of habital if key. In streams whe diffles are continuous, placement of boulders or other large, natural obstruction is important.	d bfw. riffles divided by a the width of the stream y 5 is bfw. 7 to 15, is ere	divided by the width of the stream is blw. 15 to 25	Poor Generally all flat water or shallow riffles; poor habitat; distance btw. riffles dividied by the width of the stream is a ration of >25%.
	20 19 18 17 16	15 (4) 13 12 11	10 9 8 7 6	5 4 3 2 1 Poor
្រ ក់ ភ	Optimal Banks stable; evidence of erosion or bank aifure absent or ninimal; little potential or future problems. < % of bank affected.	infrequent, small areas of erosion mostly	60% of bank in reach has areas of erosion; high erosion polential	Pool Unslable; many eroded areas "raw" areas
SCORE RB 1	Ŏ 9	Ø 7 G	7	1 0
Protection (score each M bank) st ar zo ve tre sh ma dis gra ma aln all nat	ptimal ore than 90% of the ream bank surfaces ream bank surfaces and immediate ripa rian one covered by native getation, including ses, understory rubs, or non-woo dy acrophyles; vegetative supplien through szing or mowing almal or not evident; sost all plants wed to grow traily.	great extent; more than one-half of the potential plant stubble height remaining.	Marginal 50-70% of the stream bank surfaces covered by vegetation; clisruption obvious; patches of bare soil or closely cropped vegetation common; less then one-half of the potential plant stuibble height remaining.	cor ces than 50% of the decembank surfaces overed by Vegetallon; diruption of stream ank vegetation is very git; vegetation has een removed to 5 cm less in average ubble height.
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5 4 3 5 4 3

8 7 6 8 7 6 2 1 0 2 1 0

Station ID: 68562 Benthic Wacroinvertebrate Field Data Sheet (front) Land: Use	_
Fleld Team: JEB, BWB Survey Reason: Bio. Monitoring Start Time; 8:25 Stream Name: Rossing Fork Location: Location: Location: Location: Start Time; 8:50	f _o
Date: 9/6/13 Latitude: 37.00596 Longitude: 82.72876 Stream Physicochemical	
Instrument ID number: YSI- 600 865 Temperature: /7.1 Co Conductivity: 1316 uS/cm Dissolved Oxygen: 8.06 mg/l Did instrument pass all post-calibration checks? Y/N If NO - which parameter(s) failed and action	,
Benthic Macroinvertebrate Collection	
Method used (circle one) Single Habitab (Rille) Multi Habitat (Logs, plants, etc) Riffle Quality (circle one) Good Marginal Poor None Habitats sampled (circle one) Riffle Snags Banks Vegelation Area Sampled (sq. m.): # Jabs	
Weather Observations Current Weather (circle one) Cloudy Gear Rajn/Snow Foggy Recent precipitation (circle one) Gear Showers Rain Storms Other Stream flow (circle one) Low Normal Above Normal Flood INSTREAM WATERSHED LOCAL WATERSHED FEATUREES;	in abbitory
Stream Width 15 ft Range of Depth 10 ft Average Velocity ft/Solidarge CS Oil Wells O Industrial O Silviculture Est, Reach Length 100 m Predominant Surrounding Lend Use: Surface Mining O Construction O Forest O Deep Mining O Commercial O Pasture/Grazing O Discharge O Oil Wells O Industrial O Silviculture O Silviculture O Land Disposal O Row Crops O Urban Runoff/Storm Sewers	
Hydraulic Structures: 8 Dams 8 Bridge Abutments 9 Dry 9 Pooled 8 Low 9 Normal 9 Island 8 Waterfalls 9 High 9 Very Rapid or Torrential 9 Ephameral 9 Seep	
Riparian Vegelation: Donn Tree/Shrub Taxa Canopy Cover: Donninate Type: O Trees O Shrubs O Grasses O Herbaceous Number of strata	ż
Substrate 0Est, 0P.C. Riffle 20 % Run 20 % Pool 0 %	
HighGradient Habitat Data Sheet Optimal Suboptimal Marginal Poor 1. Epifaunal Greater then 70% of substrate Suboptimal Marginal Poor Suboptimal Marginal Poor 1. Epifaunal Greater then 70% of substrate Greater then 70% of substrate substrate favorable for epifauna of substrate of policial for mix of snage, substrate labitat for mix of snage, substrate or other stable habitat and at stage to allow full colonization potential (i.e. logs/snage) substrate in the form of new policial file. logs/snage substrate in the form of new follows for collozation (may rate at high end of scale).	
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 Z. Embeddedness Optimal Suboptimal Marginal Poor Gravel, cobble, and boulder particles are 0- 25% surrounded by fine sediment. Layering of cobble provides diversity of niche space. Suboptimal Marginal Poor Gravel, cobble, and boulder particles are 25- 50% surrounded by fine sediment. Suboptimal Suboptimal Marginal Foor Gravel, cobble, and boulder particles are 50- 50% surrounded by fine sediment. Suboptimal Suboptimal Marginal Foor Gravel, cobble, and boulder particles are 50- 50% surrounded by fine sediment.	
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 3. Velocity/Depth Regime CoverAll four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). Slow is Suboptimal Only 3 of the 4 regimes present (if fast-shallow is missing, score lower shallow or slow-shallow are missing, score low). Marginal Poor Dominated by 1 veolcity/depth regime is missing other regimes).	
<0.3 m/s, deep is >0.5 SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1	

'4. Sediment Deposition	Optimal Little or no enlarg of Islands or poli and less than 5% for I; ow-gradient streams) of the be affected by sedim deposition.	nt bars (<20% ofton	bar formation, mo from gravel, sand fine sediment, 5-3 50% for low-grad the bottom affect slight deposition	estly l or 10% (20 eni) of ed;	Marginal Moderate deposi new gravel, sand sediment on bld new bars; 30-50% 80% for low-gradi	or find arid (50-	material, in development 50% (80% f	osits of fine creased bar at; more than or low- the bottom equently;
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5, Channel Flew Status	mis. Optimal Water teaches bas both lower banks, minimal amount o channel substrato exposed.	e of and ! ls.	Suboptimal Water fills >75% of available channel; 25% of channel substrate is expos	ithe or ed.	Marginal Water fills 25-75% avaliable channel, andlor riffle substrare mostly expose	of the ales	Poor	ter in mosity anding
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SCOI 8. Bank Stability (score each bank)	RE 20 19 18 17 16 Optimal Banks stable; evidenc of erosion or bank failure absent or minimal; little potentia for future problems. < 5% of bank affected.	e Mo Inf of hea bar	s (44) 13 12 11 Suboptimal oderately stable; requent, small areas eroslon mostly ailed over, 5-30% of nk in reach has area	Mo 60% has	9 8 7 6 Marginal derately unstable, 3 6 of bank in reach s areas of erosion; h erosion potential ing floods.		4 3 2 † Poor ns(able; meny e eas "raw" areas	lòqeq
SCORE RI SCORE LE 9. Vegetative Protection (score eac bank)	3 10 9 Optimal In More than 90% of the stream bank surfaces and immediate riparian zone covered by native vegetation, including frees, understory smarrophytes; vegetative disruption through grazing or mowing minimal or not evident; allowed to grow	suri suri nati one not disri not a grow grea one-l	7 6 boptimal boptimal boy of stream bank faces covered by ve vegelation, but class of plants is well-represented; upition evident but affecting full plant vith potential to any t extent; more than half of the potential t stubble height ining.	5 IMarg 50-7 bank by vedisru patel close vegel less t	4 3 4 3 ginal 0% of the stream csurfaces covered egefation; uption obvious; hers of bare soil or ely cropped lation common; then one-half of the ntial plant stuibble it remaining.	stre coy dist ban Irigi beer or le	1 0 1 0 ss than 50% of the sam bank surface ered by vegetation is the same k vegetation is the same is vegetation in an aremoved to 5 in average ble helght.	ees lon; n very s:
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1	EB, BWB	Survey Reason:		ritoring	Start Time;	9:00
Stream Name: Ro	uring Fork		djocont t	o all come	Finis'h Time:	9.25
Date: 9 Stream Physico	<u>/ S</u> / <u>/3</u> chemical	***************************************		Longilude:	82.72244	; ·
Instrument ID numbers Temperature; (6 Dissolved Oxygen;	<u>. 9 </u>	Conduc Did inst If NO -	ument pass all p	_us/cm ost-calibration ch (s) failed and actio		•
Benthic Macroin						
Method used (circle Riffle Quality (circle		gle Habitat (Riiile Marginal) Poor	Multi Habit Nona	at (Logs, plants, et	2)
	role one) Riff		Banks	Vegelation	Area Sampled	(sq.m.): 2m2
Recent precipitation (Stream flow (circle one	ele one) Clour (circle one) Clear e) Low WATERSHED		Rajn/Snow Rain Above Norm HED FEATURE		ier <u> </u>	
Stream Width Range of Dept		Surface Mining		0 Construction	♠ Forest	
Average Veloc	cityfl/s	Deep Mining		O Commercial	@ Pasture/Grazing	.
Discharge Est, Reach Lon	igth toom	Oil WellsLand Disposal		9 Industrial 9 Row Crops	0 Silvículture 0 Urban Runoff/S	torm Sewers
Hydraulic Strue	ridge Abutments	<u>Stream</u> 0 Dry 0 High		Low • Normal or Torrential	Stream Type: • Perennial • Ini • Ephemeral •	
Riparian Vegets Dominate Types O Trees O Sh O Grasses O He Number of strate	rubs Redadend	Ø Fully Ø Partia Ø Partia	Cover: Shaded (75-100% illy Shaded (50-75 illy Exposed (25-5 Exposed (0-25%))	lization	
Substrate 0Est.		iffic 80 %		20 %	Pool S	_%
The same of the sa		HighGradient l	abitat Data Si	reet		The state of the same
Substrate/Available fa Gover co m loi or sta pro ara trai	olonization and fish cover; itx of snags, submerged gs, undercut banks, cobble rother stable habilet and at a colow full colonization otential (i.e. roge/snags firat a not new fall and not nisent).	well suited for full colonization potential, adequate habitat for maintenance of popula presence of additional a substrate in the form of all, but not yet prepare colinzation (may rate all end of scale).	habilat; 20-40% habilat; habilat; habilat; habile destrable; frequently or remove finav d for high	nabilat în y less than o sbustrate u r disturbed	Poor Less (han 20% stable ablfaf, lack of habifat i bvious; substrate instable or lacking.	ទ
SCORE 20 2. Embeddedness	19 18 17 16 Optimal	15 (4.) 13 12 1 Suboptimal	l 10 9 8 Margh	7 6 5	4 3 2 1 Poor	
Gra hot 25% sed coh . dlve	avel, cobble, and ulder particles are 0- ¼ surrounded by fine liment. Layering of bble provides ersily of niche space,	Gravel, cobble, and boulder particles are 50% surrounded by f sediment.	Gravel, col: 25- boulder par	oble, and Gra dicles are 50- bot inded by fine mos stri	avel, cobbie, and ulder partites are re thath 75% rounded by line iment.	
SCORE 20 3. Velocity/Depth	19 18 17 16 Optimal	15 14 13 12 11 Suboptimal	10 9 8 Margin:		4 3 2 1 Poor	
Regime Cov	erAll four	Only 3 of the 4 regime	s Only 2 of the	4 habitat Dom	inated by 1	
pres slow fast-	ent (slow-deep, i r-shallow, fast-deep, i shallow), Slow is	present (if fast-shallor s missing, score lowe han If missing other egimes).		low-sirallow (usu	city/depth regime ally slow-deep).	
	m/s, deep is >0,5 19 18 17 16 - 1	5 14 13 12 11	10 9 8	7 6 5 4	3 2 1	

'4. Sediment Deposition SCOR	Optimal Little or no enlarge of Islands or poin and less than 5% for I jow-gradient streams) of the bo affected by sed ince deposition.	t bars (<20% Ltom	Suboptimal Some new incres bar formation, m from gravel, sand fine sediment, 5- '50% for low-grad the bottom affect slight deposition pools.'	ostly I or 30% (20- lent) of ed;		d or fine l and % (50-	Poor Heavy depos material, mor development 50% (80% for gradient) of th changing freq pools almosta	eased bar Inore than low- a bottom uently:
aco.	20 19 18 17	16	15 14 13 12	91)	10 9 8 7	Ġ	5 4 3 2	1
5, Claannel Flow Status	mis. Optimal Water reaches base both lower banks, a	e of	Suboptimal Water fills >75% o available channel;	f the	Marginal Water fills 25-75% avallable channel		Poor Very lillle wate channel and m	
	minimal amount of channel substrate is exposed.		25% of channel substrate is expos		and/or riffle subst are mostly expose	e(I.	present as slan	
SCORE 6, Channel Alleration	E 20 19 18 17 1 Öptimal Channelization or dredging absent or minimal; stream with normal patter,	'1 ! !	Suboptimal Some channelizatic present, usually in of bridge abutame evidence of past channelization, i.e., dredging, (greater t past 20 yr.) may be bresent, but recent thannelization is no present.	on areas nlsj kan t	Marginal Marginal Channelization ma extensive; embank or shoring structu present on both ba and 40 - 80% of sir- reach channelized a disrupted.	y be ments res nks; eam and	5 4 3 2 Poor Poor Bank's shored w gablon or cemer 80% of the strea changelized and disrupted. Instree habitat greatly al removed entirely	nt over m reach am lered or
SCORE	20 19 18 17 16		5 14 13 12 4	1 1	09876	E	1 4 3 2 1	
7. Frequency of Riffles	Optimal	•	Subopilmal		Marginal	,	Poor	
(or bends)	Occurrence of riffles relatively frequent ration of distance blw. riffler divided by width of the stream 47:1 generally to 7); variety of habitatifies are continuous, lacement of boulders or ther large, natural obstruction is important	io ir i b e th v5 is is ore	ccurrence of rifflés rirequent; distance fw. riffles divided by Le width of the stres blw. 7 to 15,	be y pr im di di	ccasional rifile or end; bottom confot rovide saome habit istance btw. rifiles vided by the width e stream is btw. 15	al; h ri of w	enerally all flat v r shallow riffles; abligit; distance i fles dividied by Idih of ihé sfrear u[on of >25%.	poor iw. the
	0 19 18 17 16	15	14 13 12 11	10	9 8 7 6	5	4 3 2 1	
oi fil m fo	Optimal anks stable; evidence ferosion or bank illure absent or inimal; ilttle potential r future problems. ≺ 6 of bank affected.	Infi of c hea ban	Suboptimal derately stable; requent, small areas erosion mostly jed over, 5-30% of lk th reach has area rosion.	s 60% has high	Marginal derately unstable, a 4 of bank in reach e areas of erosion; nerosion potential ing floods.	are	Poor slable; meny ero as "raw" areas	ďeď
SCORERB 10		8			4 3		1 0	
SCORE LB 10 9. Vegetative Op	9 otimal	But	7 G ooptimal	5 ×	4 3	2 Foo		
Protection (score each Mo	re than 90% of the		0% of stream bank		0% of the stream		than 50% of the	
bank) str	eam bank surfaces		aces covered by		surfaces covered	strea	am bank surfaces red by vegetation	3
	l immediale ripa rian ne covered by native		'à Vegelation, but class of plants is		egefation; Iption obvious;		ption of stream	rij
yeg	etation, including es, understory		vell-represented; ption evident but		nes of bare soll or ly cropped		vegetation is ve vegetation has	ry
sinr	ubs, or non-woody	nota	ifecilng full plant	vegel	lation common;	been	removed to 5 cm	1
	rophyles; vegetalive upilon through	grow	th potential to any extent; more than		hen one-half of the ntial plant stuibble		s in average Ie helght.	
	ing or moving imal or not evident;	one-h	alf of the potential stubble height	heigh	f remaining.			
alma	ost all plants	remai						
natu	ved to grow rally:			22				
SCORE RB 10 SCORE LB 10	9 9 5	8 7	6 6	5 4	3 3	2 1	0	
Riparian Optir	nal	Subor	olimai	Margin	ıal .	Poor		
(l.e, p roadb Iawns	n; human aclivities Parking lols,	12-18 r have l	of riparian zone n; human activites mpacled zone inimally.	Ğ-12 m;	of riparian zone ; homan acilvite id mpacied zone a eal.	<6 m; l riparia	if fiparian zone Illie or no n yegetalion due an activilles.	•,
SCORE RB 10	9	B 7	Ğ	5 4	(2)	2 1	Ū	
SCORELB 10	D 8	B 7	6	5 4	3	2 1	0	SCORE

Station ID:	9.01-BRFK4	Benthic Macroin Ecoregion:	rertebrate Field Data	a Sheet (front) Land: Use	
,		Survey Reason:	io. Monitoring	Start Time;	9:85
Stream Name: Rec	oring Fort	Location: 25m	named tributary	Finish Time:	10 :15
Date: Stream Physico		Latilude: <u>36.98</u>	SS8 Longitude:	22.72430	
Instrument ID numbers Temperature: 6 Dissolved Oxygen:		Conductivi Did instrun	(y: 1307 us/em nent pass all post-calibration loh parameter(s) failed and		
Benthic Macroin				Aid of Chris	
Method used (circle Riffle Quality (circle		de Habital (Riide) di Marginal	Multi Poor Nona	Habitat (Logs, plants, e	lc)
	rele one) Riffl		Banks Vegelatio	n Area Sampleo	(sq.m.): 2m²
Recent precipitation (Stream flow (circle one	cleone) Cloud (clicleone) Clear b) Low WATERSHED	Showers Normal LOCAL WATERSHI	ED FEATUREES:	Olher <u></u>	
Stream Width Range of Dept	_25_ ft	Predominant Surroundi Surface Mining	ng Land Use:	1 • Forest	
Average Veloc	cityfl/s	Deep Mining	0 Commercial	O Pasture/Grazin	Ē
Discharge Est, Reach Lon	ngth loom	Oil Wellsθ Land Disposal	0 Industrial O Row Crops	0 Silvículture O Urban Runoff/	Storm Sewers
Hydraulic Struc Dams B Dams B Island W Other	tridge Abutments	Stream Flo 0 Dry 0 High	Div: θ Pooled θ Low θ No θ Very Rapid or Torrential	Sfream Type: rmal Perennial 0 fr 0 Eplaemeral	
Riparian Vegela				annel Afterations:	
Dominate Type; • Trees • Sh	rubs Red mac			redging hannelization	
0 Grasses 0 Hei Number of strate	rbaceous Ochumal	• • • • • • • • • • • • • • • • • • •		ull @Partial)	
Substrate 0Est.		ine 60 %	Run 40 %	Pool 🔿	%
To the state of th		HighGradient Hab	ltat Data Sheet		
Substrate/Available far Cover co mi log or sta fic	vorablo for epifatina plonization and fish cover; fix of snags, sübmerged gs, undercut banks, cobble coller stable habilat and at ngo to allow full colonization blential (i.e. logs/snags linat and not new foll and not	well suited for full colonization potential; adequate habitat for maintenance of population presence of edditional	or removed.	Poor Less (han 20% stable habitat, lack of habitat obylous; substrate unstable or lacking.	
SGORE 20 2. Embeddedness	19 18 17 16 Optimal	15 (14) 13 12 11 Suboptimal	10 9 8 7 6 Marginal	5 4 3 2 1 Poor	
Gra bou 25% sedi cobl . dive	avel, cobble, and ulder particles are 0- 4 surrounded by fine 11 11 ment. Layering of 5 15 ble provides 15 filche space,	Gravel, cobble, and boulder particles are 25 50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-	Gravel, cobble, and	
SGORE 20 3. Velocity/Depth	19 18 17 16 1	5) 14 13 12 11 Suboptimal	10 9 8 7 6 Marginal	5 4 3 2 1 Poor	
Regime Cove	erAll four O	nly 3 of the 4 regimes	Only 2 of the 4 habitat	Dominated by 1	
prese slow- fast-s	ent (slow-deep, is -shallow, fast-deep, th shallow). Slow is re	resent (if fast-shallow missing, score lower an If missing other gimes).	regimes present (if fast- shallow or slow-shallow are missing, score low).	veolcity/depth regime (usually slow-deep).	
<0.3 r SCORE 20 1	m/s, deep is >0.5 19 18 17 1 ₉ 15	14 13 12 (11)	10 9 8 7 6	5 4 3 2 1	

1199.01-BRFK4

4. Sediment	Optimal		Suboplimal		Marginal		Poor	
Deposition SG	Little or no enta of Islands or po and less than E for I;ov-gradien streams) of the affected by sedi deposition.	oint bars % (<20% t boltom	Some new increbar formation, m from gravel, san fine sediment. 5- 50% for low-grad the bottom affect slight deposition pools.	ostly d or 30% (20- llent) of led;	Moderale depos new gravel, sand sediment on blo new bars; 30-50; 80% for low-grad	l or fine l and % (50-	Heavy deposit material, Incre development; f 50% (80% for lo gradient) of the changing frequ- pools almost ab	ased bar döre thad ow- bottom ently;
,	20 19 18 1	7 16	15 14 13 12	1	10 9 8 7	ß	5 4 3 2	1
5, Channel Flow Status	m/s. Optimal Water reaches b. hoth lower banks mininal amount channel substrat exposed.	, and of	Suboptimal Water fills >75% o available channel 25% of channel substrate is expos	of the or	Marginal Water fills 25-75% available channel andlor riffle substare mostly expose	rates	Poor Very lille water channel and mo present as sland pools,	sity
	ORE 20 19 18 17	16	15 14 13 12	11	10 9 8 7 6	3	5 4 3 2	1 -
6, Channel Alterati	on Öplimal Channelizatlon or dredging absent c minimal; stream w normal patter,	or vith (() () ()	Suboplimal Some channelizati present, usually in of bridge abuteme evidence of past channelization, i.e., tredging, (greater t past 20 yr.) may be present, but recent thannelization is no	areas nls; l han r	Marginal Channelization ma extensive; embank or shoring structu present on both ba and 40 - 80% of str reach channelized disrupted.	ments res inks; eam d	Poor Banks shored wh gabton or cement 80% of the strean channelized and Usrupted, Instrea nabitat greally allo removed entirely,	over reach m ered or
SCO	RE 20 19 18 17		resent. 5 14 13 12 1	1 1	0 9 8 7 6	5	4 3 2 1	
7. Frequency of Riffl	es Optimal		Suboptimal		Marginal	,	Poor	
(or bends)	Occurrence of riffice relatively frequent is of distance blw. If if divided by width of steam <7:1 *generato 7}: variety of habit figey. In streams wiffices are continuous placement of boulde or other large, naturobstruction is impor	alio In led bt the th illy 5 Is fals here is, rs el fant,	ccurrence of rifiles frequent; distance xv. rifiles divided b e width of the strea btw. 7 to 15.	be y př im dís dís	ccasional rifle or end; bollom confot ovide saome habit stance btw. riffles vided by the width a stream is btw. 15	ars of alj he rif of wi	enerally all flat wa shallow riffles; p shlfat; distance bt fles dividied by th dih of the stream lion of >25%.	oor w.
	20 19 18 17 16	15	14 (13) 12 11	10	9 8 7 6	5	4 3 2 1	
8. Bank Stability (score each bank)	Optimal Banks stable; eviden oferosion or bank failure absent or minimal; little potenti for future problems. < 5% of bank affected.	Infr of e al fieat ban	Suboptimal derately stable; equent, small areas rosion mostly led over, 5-30% of to fit reach has area rosion.	s 60% has high	Marginal Jerately unstable, a Sof bank in reach areas of erosion; recosion potential ng floods.		Poor slable; meny erod as "raw" areas	eď
SCORE RB	1ŏ 9	8	7 6	5 4 5 4		2	1 0	
SCORE LB		8 :					i O	
Protection (score each bank)	Optimal More than 90% of the stream bank surfaces and immediale ripariar zone covered by native vegetation, including frees, understory strubs, of non-woody macrophytes; vegetative lisruption through prazing or mowing cinimal of not evident; Imost all plants Ilowed to grow aturally.	70-90 surfa surfa nafivi not w disrup not af greaf one-ha	optimal % of stream bank ces covered by å vegelation, but lass of plants is ell-represented; otion evident but feeling full plant h potential to any extent; more than alf of the potential stubble height aling.	bank by ve disruj patch closel vegela less th poten	inal y of the stream surfaces covered gefation; ption obvious; es of bare soil or ly cropped ation common; nen one-half of the tial plant stuibble remaining.	strea coyer disru bank high; been or les	than 50% of the m bank surfaces red by vegetation ption of stream vegetation has removed to 5 cm in average te helght.	
SCORE RE 1	D D	8 7	6	5 4	3	2 1	0	
	plimal	8 7 Subop	6 limal	5 4 Margina	3 al .	2 1 Poor	Q	
Vegetative Zone Wicith W (score each bank) >1 (i. ro lai		Width c 12-18 m	of riparian zone n; human activites npacled zone	Width o G-12 m;	f riparlan zone Inuman acilviteid npacted zone a	Width i <6 m; li ripariar	f riparian zone ille or no ı yegetalion d'ue ın activiiles.	•
SCORERB 10 SCORELB 10	9	® 7 8 7			3	2 1 2 1	O O	SCORE
OONETE M		u /	U	V 1	-	~ '	•	700NA

Station ID: 199.01-6CPT1 Benthic Macroinvertebrate Field Data She	eef: (front) Land: Use
Field Team: JEB, BWB Survey Reason: Bio. Monitoring Stream Name: Potcamp Fock Location: 100m dawns weam of pon	Start Time: 10:10
Date: 9/6/13 Latitude: 36.95596 Longitude: 2 Stream Physicochemical	32.71088
Instrument ID number: VSI-66485 Temperature: 19.7 Go: Conductivity: 918 u8/cm Dissolved Oxygen: 7.50 mg/l Dissolved Oxygen: 7.50 mg/l If NO - which parameter(s) failed and action	
Benthic Macroinvertebrate Collection	Lid () policy
Method used (circle one) Single Habitat (Riffle) Multi Habita Riffle Quality (circle one) Good Marginal Poor Kone Habitats sampled (circle one) Riffle Snags Banks Vegelation # Jabs	at (Legs, plenis, elc) Area Sampled (sq. m.): 2 m²
Weather Observations Current Weather (circle one) Cloudy Clear Rain/Snow Foggy Recent precipitation (circle one) Clear Showers Rain Storms Oth Stream flow (circle one) Low Normal Above Normal Flood INSTREAM WATERSHED FEATURES: Predominant Surrounding Land Use:	ieir
Stream Width Range of Depth 1.5 ft Surface Mining Occurred Construction	Porest Pasture/Grazing Silviculture Urban Runoff/Storm Sewers
Hydraulic Structures: 9 Dams 9 Bridge Abutments 9 Dry 9 Pooled 9 Low 9 Normal 9 Island 9 Waterfalls 9 Other	Stream Type: Petennial O'Intermittent D'Eplaemeral O'Seep
Riparian Vegetation: Dom. Tree/Shrub Taxa Canopy Cover: Dominate Type: Trees Shrubs Grasses Herbaceous Canopy Cover: Grupy	lization
Substrate 0Est, OP.C. Substrate 0Est, OP.C. Substrate 0Est, OP.C.	Pool_5_%
Optimal Suboptimal Marginal 1. Epifaurial Greeferthen 70% of substrate 40-70% mis of stable inbitat; 20-40% mix of stable I Substrate/Available favorable for epifauna well suited for full habitat; habitat for colonization and fish cover; mix of snages, submerged logs, undercut banks, cobbie maintenance of populations; frequently disturbed or or other stable habitat and at stage to allow full colonization aubitrate in the form or new potential (i.e. logs/snage inat rare not new full and not collozation (may rate at high end of scale).	Poor Less (han 20% stable abitat, lack of habitat is obytous; substrate instable or lacking.
boulder particles are 0-boulder particles are 50-boulder particles are	4 3 2 1 Poor avel, cobbie, and ulder partices are re thatn 75% rounded by fine liment.
SCORE 20	4 3 2 1 Poor Insted by 1 city/depth regime ally slow-deep).
SCORE 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4	1321

	4. Sedinjent	Optimal		Suboplimal		Marginal			oar	f: E1
	Deposition	Little or no enlarge of Islands or point and less than 5% (for I; ow-gradient streams of the bot affected by sedime deposition. ORE	t bars (<20% tom	bar formation, mo	stly or 0% (20- ent) of d;	Moderate deposit new gravel, sand sediment on old new bars; 30-50% BO% for low-gradi	or fine and (50-	developn 50% (80° gradient) changing	eposits of , increase , increase , increase % for low- of the bot , frequently nost abser	d bar ë thati Kom Iyi
		20 19 18 17	16	15 14 13 12	11	io 📵 8 7	Ġ	5 4 3	3 2 1	
	5, Clannel Flow Status	mis. Optimal Water reaches base both lower banks, a minimal amount of channel substrate is exposed.	nd s.	Suboptimal Water fills >75% of available channel; 25% of channel substrate is expose	or ed.	Marginal Water tills 25-75% available channel, and/or riffle substr are mostly expose	ates	Pools.	water in nd mostly s slandlng	
	SGO 6, Channel Alteratio	RE 20 19 18 17 1	1	Suboptimal Suboptimal Suboptimal Some channelization present, usually in a of bridge abutemen eyidence of past channelization, i.e., dredging, (greater th past 20 yr.) may be present, but recent channelization is not present.	n lej lej	40 9 & 7 6 Marginal Channelization may extensive; embankr or shoring structur present on both bai and 40 - 80% of stre each channelized a disrupted.	nents es iks; am	5 4 3 Poo Banks sho gablon ere 80% of the channelized disrupted. I habitat gree removed er	red with cement ov stream re d and nstream ally altered	ach
	SCOR			15 14 (3) 12 11	1	0 9 8 7 6			2 1	
	7. Frequency of Riffle (or bends)	Optimal Occurrence of riffies relatively frequent ration of distance blw. riffied divided by width of the stream 47:1 generally to 7); variety of habita if key. In streams whe riffies are continuous, placement of boulders or other large, natural obstruction is important.	io i i i e ti /5 is is ere	Subopilmal Decurrence of riffles nfrequent; distance nfw. riffles divided by he width of the streat s btw. 7 to 15.	di di	Marginal recasional rifile or end; bottom confou rovide saome habite stance btw. rifiles vided by the width e stream is btw. 15	rs o alj l r of v	Poor Generally all oy shallow ri ablitat; dista iffles dividia vidin of the s alion of >25	files; poor ance btw. ad by the stream is	r
		E 20 19 18 17 16		14 13 12 11	10	9 8 7 6	5	4 3 2 Poor	1	
	8. Bank Stability (score each bank)	Optimal Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. < 5% of bank affected.	Ini of he ba	Suboptimal oderalely stable; frequent, small areas eroslor mostly aled over 5-30% of nk fr reach has areas eroslon.	60% has hig	Marginal derately unstable, 3 & of bank in reach s aréas of erosion; h erosion potential Ing floods.	ig- Ui ar	Poor nslable; men eas "raw" ar	eas Proded	
	SCORERB		8	7 6	5 5	4 3 4 3	2 2	1 0		
	Protection (score each bank)	Optimal	Sur 70-1 sur nati one not disr not grow grea one- plan	boptimal 90% of stream bank faces covered by ive vegelation, but to class of plants is well-represented; uption evident but affecting full plant with potential to any the extent; more than half of the potential t stubble height aining.	Mary 50-7 bank by ve disru pato close vege less pote	glinal O''' of the stream surfaces covered egefalion; uption obvious; hes of bare soil or ely cropped lation common; then one-half of the ntial plant sluibble t remaining.	Por Les stre coy dist ban higi bee or le		rfaces etation; ream i is very i has: o 5 cm	
	SCORE RE 1	0 9	8 7		5 4	3	2 1			
V	egefative Zone Width W score each bank) > (l rc la	plimal	Width 12-18 have	optimal 1 of riparian zone	Ğ-12 π	of riparian zone i; human activiteid impacted zone a	Poor Widtl <6 m rlpari		n due	•,
	SCORERB 10		8 7 8 7	6	5 4 5 4	3 3	2 1 2 1	O O	ξ	SCORE

	Station ID:	1199.01-8PR1	Benthic Wacro	oinvertebrate	Field Data :	Sheet (front) Land: Use	
-	Fleld Team:	JEB, BWB	Survey Reason:	Bio. Moni	toring	Start Time:	13:20
`` -	Sfream Name:	Powell River	Location:	50m upstree	9	Finish Time:	13:45
	^{Date:} Stream Phys	9/5/13 sicochemical	Latilude; 37	.01264	Longllude:	82. 695 <i>9</i> 8	:
	Dissolved Oxyge	16.7 Ca n; <u>7.93 mg/l</u>	Gondu Did in If NO	ictivity: 910 strument pass all - winich paramete	post-calibration	checke? Y/N action	
E	Benthic Mac	roinvertebrate Coll	ection ·			AL-LIN PINA	*
				(ile)	Multi Ha	abilat (Logs, plenis,	elc)
	liffle Quality abitats sampled #jabs		ood Margina ifile Snags	al Poor Banks	None Vegelation 	Area Sample	d (sq.m.): 2m2
Cu Re	-	(circle one) Old (circle one) Clea cie one) Low		Rajn/Snov Rain Above Norr	Storms	Other	
	FEÀTÚ		LOCAL WATER	RSHED FEATUR) ounding Land Use:	ĘEŞ;		
	Stream		• Surface Mining	ounding Land Use;	θ Construction	♣ Forest	
	Range o	f Depth O. 5 ft Velocity ft/s	Deep Mining		O Construction O Commercial	Prorest Pasture/Grazi	ng
	Discharg	gecfs	Oil Wells		O Industrial	0 Silviculture	·
	Est, Read	ch Length 100m	O Land Disposal		O Row Crops	6 Urban Runoff	Storm Sewers
	0 Dams	<u>c Structures:</u> θ Bridge Abutments θ Waterfalls	<u>Síres</u> 9 Dr 9 Hi _s		9 Low 9 Norm I or Torrential	Stream Type: nal 0 Perennial 0 l 0 Ephenneral	Intermittent
				py Cover:		nel Alterations:	
	Dominale			lly Shaded (75-100)			
	•	O'Shrubs Bicch		tially Shaded (50-7 tially Exposed (25-		nnelization 0Partial)	
	Number o	fstrata 3	OFull	y Exposed (0-25%)	i (0)-1111	or at tial)	
	Substrate	0Est. OP.C.	Riffle 70 %	Run	30 %	Pool	%
	1			Habitat Data S	Sheet		
1. Ep Subs Gove		colonization and fish cove mix of snags, submerged logs, undercut banks, cobl or other steble habilet and stago to allow full colonizal potential (i.e. logs/snags if are not new fall and not franisent). r	Su hoptimal rate 40-70% mis of stab Well suited for full colonization potenti adequate habitat for the maintenance of pop at presence of addition ion substrate in the form at fall, but not yet prepi colinzation (may rate end of scale).	Mabilati 20-402 habilati 20-402 iali avallabti r destrabi vialions frequent val or remov ard for at figh	arginal 4 mix of stable ; habifat lity less than e; sbustrate lly disturbed ved.	Poor Less (han 20% stabl habitat, lack of habita obylous; substrate unstable or lacking.	
2. Em	SCOR beddedness	E 20 19 18 17 16 Optimal	15 (14) 13 12 Suboptimal	11 10 9 8 Marc	8 7 6	5 4 3 2 1 Poor	
<i>2.</i> Em	Dendenliess	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversily of niche space,	Suboptimal Gravel, cobble, an boulder particles a 50% surrounded b sediment.	d Gravel, co	obble, and articles are 50- ounded by fine	Grayel, cobbie, and boulder partites are more that 75% surrounded by line sediment.	
9 15-1		20 19 18 17 16	15 (4) 13 12		T 100	6 4 3 2 1	
3. Velor Regime	city/Depth	Optimal CoverAll four	Suboptimal Only 3 of the 4 regin	Margi Margi Only 2 of the		Poor Pominated by 1	
	-	velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow), Slow is	present (if fast-shal is missing, score to than if missing othe regimes).	low regimes pr wer shallow or	esent (if fast- v	reoloify/depth regime usually slow-deep).	
	genns	<0.3 m/s, deep is >0.5 20 19 18 17 16	15 14 13 12 1	1 40 9 8	7 6 5	1224	
	SCORE	מו זו מו פו עב	10 14 10 12 1	1 (20,0)	, u a	4 3 2 1	

'4. Sediment Deposition	Optimal Little or no enlar of Islands or pol and less than 59 for I jow-gradient streams) of the b affected by sed in deposition.	nt bars % (<20% oftom	, fire sediment, 6-3 50% for low-gradi the bollom affecte slight deposition i	ostly or o% (20 ent) of ed;	Marginal Moderate deposi new gravel, sand sediment on bld new bars; 30-50% 80% for low-gradi	l or fine and 4 (50-	Poor Heavy deposit material, increadevelopment; in 50% (80% for la gradient) of the changing freque pools almost ab	ased bar tore than bottom ently;
, ,	ORE 20 19 18 17 m/s.	16	pools. 15 14 13 12	11	io 9 8 7	ß	5 4 3 2	1
5, Channel Flow Status	Optimal Water reaches ba both fower banks minimal amount c channel substrate exposed.	and if	Suboptimal Water fills >75% of available channel; 25% of channel substrate is exposi	or	Marginal Water fills 25-75% available channel, and/or riffle substi are mostly expose	rates	Poor Very lilde water channel and mos present as sland pools,	ity
SC 6, Channel Alterat	ORE 20 19 18 17	r ith	Suboptimal Some channelizatio present, usually in a of bridge abutemer evidence of past channelization, i.e., dredging, (greater ti past 20 yr.) may be present, but recent thannelization is no present.	n nisj njeas	10 9 8 7 6 Marginal Channelization may extensive; embank or shoring structur present on both bai and 40 - 80% of stree reach channelized a disrupted,	y be ments res nks; eam	5 4 3 2 Poor Poor Banks shored wit gablon or cement 80% of the stream channelized and disrupted, instreat habitat greatly altoremoved entirely,	hi over reach n
And the second s	DRE 20 19 18 17 1	-	5 (4) 13 12 11	1	0 9 8 7 6	5	1 4 3 2 1	
7. Frequency of Rif	fles Optimal Occurrence of riffles relatively frequent ra of distance biw. riffle divided by width of is stream <7:1 *general to 7}: variety of habit if key. In streams wi riffles are continuou placement of boulde or other large, nature obstruction is import	allo In ed bi he th lly 5 Is tats here s, rs	Subopilmal locurrence of rifflés ifrequent; distance fw. riffles divided by te width of the strea blw. 7 to 15,	, b m d di	Marginal bocasional rifile or end; bottom confou end; bottom confou fabili istance btw. rifiles vided by the width e stream is blw. 15 i.	al; h	Poor Jenerally all flat wa r shallow riffles; p ablitat; distance bt ffles dividied by th idth of the stream tion of >25%.	oor w. e
	RE 20 19 18 17 16	15	14 13 12 11	10	9876	5	4 3 2 1	
8. Bank Stability (score each bank)	Optimal Banks stable; evident of erosion or bank failure absent or minimal; little potentia for future problems. < 5% of bank affected.	Infi of e il fiea ban	Suboptimal derately stable; equent, small areas roslon mostly tled over, 5-30% of thin reach has areas roslon,	609 has hig	Marginal derately unstable, 3 & of bank in reach s areas of erosion; h erosion potential ing floods.		Poor slable; many erod as: "raw" areas	e वं
SCORE RE			7 6	5	4 3	2	1 0	
SGORE LE 9. Vegetative Protection (score each bank)	Optimal	Sub 70-9 surfa nativ one o not v disru not a grow great one-h	7 6 coptimal 0% of stream bank aces covered by the vegetation, but class of plants is vell-represented; uption evident but freciting full plant th potential to any extent; more than talf of the potential stubble height ining.	Mary 50-7 bank by vo disru patel close vege less pote	4 3 ginal o% of the stream csurfaces covered egetation; uption obvious; has of bare soil or ely cropped lation common; then one-half of the ntial plant stuibble f remaining.	Poor Less strea coye distru bank high; been or les	f 0 r s than 50% of the am bank surfaces red by vegetation uption of stream vegetation is very vegetation has removed to 5 cm is in average ile helght.	
SCORE RE	10 9	B 7	6	5 4	3	2 1	0	
Vegetative Zone Width (score each bank)	Oplimal	Width . 12-18 r have i	6 stimal of riparian zone my human activites mpacled zone Inimally.	Ğ-12 m	nal of riparlan zone ; human activileid mpacted zone a	<6 m; l riparia	0 If riparian zone Iille or no n yegetallen due an activilles.	٠,
SCORERB 1		8 7	6 6	5 4 5 4	3 3	2 1 2 1	0	SCORE

APPENDIX B:

TABLES



Table 1. Quantitative listings of macroinvertebrates collected 05 and 06 September 2012 from six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia.

Order	Family	Fall 2012								
	-	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1			
Ephemeroptera	Baetidae	1				24	11			
	Isonychiidae		1			4				
Plecoptera	Perlodidae						1			
	Leuctridae					2	67			
	Peltoperlidae				1					
Trichoptera	Hydropsychidae	97	82	53	67	58	19			
	Hydroptillidae		1							
	Philopotamidae		4		2	5	1			
	Rhyacophilidae	1								
Coleoptera	Elmidae		1		1	3	6			
·	Dryopidae						1			
Diptera	Chironomidae	2	14	25	17	2	1			
Diptera	Empididae		2	10	2	2				
	Simuliidae		1	1		2	2			
	Stratiomyidae									
	Tipulidae	3	2	2	3		2			
Odonata	Calopterygidae		1							
	Gomphidae			1			2			
Megaloptera	Corydalidae	1				2				
Decapoda	Cambaridae		1	1	1	1				
Veneroida	Spaeriidae					3				
Annelida	Oligochaeta	2	3	17	16					
	•	107	113	110	110	108	113			

Table 2. VSCI metrics calculated from the macroinvertebrates collected 05 and 06 September 2012 at six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia

Family Metrics		Fall 2012								
ranning Metrics	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1				
Taxa Richness	7	12	8	9	12	11				
EPT Taxa	3	4	1	3	5	5				
% Ephemeroptera	0.93	0.88	0	0	25.93	9.73				
% PT - Hydropsychidae	0.9	4.4	0	2.7	6.5	61.1				
% Scrapers	0	1.77	22.73	0.91	2.78	5.31				
% Chironomidae	1.87	12.39	70.91	15.45	1.85	0.88				
% 2 Dominant	93.46	84.96	5.87	76.36	75.93	76.11				
нві	5.83	5.76	0	5.77	5.13	1.93				
VSCI	29.02	34.98	28.19	32.32	46.31	56.91				

Table 3. Physiochemical water data collected 05 and 06 September 2012 at six aquatic sample sites for surface mine permit number 1101760 in Wise County, Virginia.

Parameter	BRFK-1	BRFK-2	BRFK-3	BRFK-4	BCPT-1	BPR-1
Temperature (Celsius)	17.9	17.1	16.9	16.5	19.7	16.7
Specific Conductance (µs)	1244	1316	1310	1307	918	910
рН	7.94	8.16	8.39	8.4	8.17	7.75
Dissolved Oxygen mg/l)	8.12	8.06	8.24	8.91	7.5	7.93

APPENDIX C:

GRAB SAMPLE ANALYSIS





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Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

24273

Sample Identification: 1101760 - BPR1

Site Description:

Report Date: 09/18/13

Lab Sample No.: 1359591

Client No.: EMI Project No.: 97

Date Collected: 09/05/13

Time Collected: 1320 Sample Matrix: AO

Collected By: J. BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	9/9/2013	1553	MCF
Alkalinity		129	mg/l CaCO3	1.00	1.00	SM 2320B-2011	9/9/2013	1313	MCF
Alkalinity, CO3	Not NELAP	0.682	mg/l	0.100		4500-CO2-D	9/11/2013	1150	SAS
Alkalinity, HC03	Not NELAP	129	mg/l	0.100		4500-CO2-D	9/11/2013	1150	SAS
Bromide		0.050 J	mg/l	0.020	0.200	EPA 300.0	9/12/2013	1828	KMC
Chloride		0.624	mg/l	0.011	0.100	EPA 300.0	9/13/2013	135	KMC
Conductivity		1013	umhos/cm	1.00	1.00	SM 2510B-2011	9/6/2013	1136	THR
Flow, Measured	Not NELAP	94.0	gpm				9/5/2013	1320	FLD
Hardness, Total		528	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	9/9/2013	1316	SAS
Nitrate		0.399	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1302	KMC
Nitrite		0.082 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1302	KMC
рН	Not NELAP	7.75	STD			SM 4500-H+B-2011	9/5/2013	1320	FLD
Sulfate		372	mg/l	1.03	5.00	EPA 300.0	9/10/2013	1533	KMC
Total Dissolved Solids		714	mg/l	1.00	1.00	SM 2540C-2011	9/6/2013	1010	JRS
Total Suspended Solids		4.40	mg/l	1.00	1.00	SM 2540 D-2011	9/5/2013	2201	BAB

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136. This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038 WV Laboratory ID#: 105 EPA Laboratory ID#: VA00010 The release of this report is authorized by:

R. J. Porter **Technical Director**

Flow if Avaliable (GPM):

94.0

Type of Sample: Grab

16.7

BDL = Below Detection Limit FLD = Field Technician

Temp. if Available (C): Depth if Available (Ft): Analysis Package Code:

EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume SV = Sample volume indicated by method not used J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance

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Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1101760 - BPR1

Site Description:

NORTON, VA

24273

Report Date: 09/18/13

Lab Sample No.: 1359591

Client No.: 95

EMI Project No.: 97

Date Collected: 09/05/13 Time Collected: 1320 Sample Matrix: AQ

Collected By: J. BREEDING

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.116	mg/l	0.0016	0.050	200.7	9/9/2013	1325	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/13/2013	1641	CLS
Arsenic, Total	0.291 J	ug/l	0.154	2.00	200.8	9/13/2013	1641	CLS
Barium, Total	74.0	ug/l	0.171	2.00	200.8	9/13/2013	1641	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/13/2013	1641	CLS
Boron, Total	0.0090 J	mg/l	0.0061	0.030	200.7	9/10/2013	1343	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/13/2013	1641	CLS
Chromium, Total	0.225 J	ug/l	0.098	2.00	200.8	9/13/2013	1641	CLS
Cobalt, Total	0.252 J	ug/l	0.143	2.00	200.8	9/13/2013	1641	CLS
Copper, Total	0.460 J	ug/l	0.080	2.00	200.8	9/13/2013	1641	CLS
Iron, Total	0.231	mg/l	0.0089	0.050	200.7	9/9/2013	1325	AWM
Lead, Total	0.151 J	ug/l	0.054	2.00	200.8	9/13/2013	1641	CLS
Magnesium, Total	53.9	mg/l	0.032	0.500	EPA 200.7	9/9/2013	1226	AWM
Manganese, Total	0.021 J	mg/l	0.0023	0.050	200.7	9/9/2013	1325	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/6/2013	1216	SAS
Nickel, Total	0.516 J	ug/l	0.169	2.00	200.8	9/13/2013	1641	CLS
Selenium, Total	1.01 J	ug/l	0.731	2.00	200.8	9/13/2013	1641	CLS



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Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1101760 - BPR1

Site Description:

NORTON, VA

24273

Report Date: 09/18/13 Lab Sample No.: 1359591

> Client No.: 95

EMI Project No.: 97

Date Collected: 09/05/13

Time Collected: 1320 Sample Matrix: AQ

Collected By: J. BREEDING

	Sample					Date	Time	
Parameter	Result	Units	MDL	RL	Method	Analyzed	Analyzed	Analyst
_								
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/13/2013	1641	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/13/2013	1641	CLS
Zinc. Total	3.23 J	ug/l	0.328	10.0	200.8	9/14/2013	1456	CLS



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Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1101760 - BRFK1

Site Description:

NORTON, VA

24273

Report Date: 09/18/13

Lab Sample No.: 1359592

Client No.: EMI Project No.: 97

Date Collected:

09/05/13 Time Collected: 1420 Sample Matrix: AO

Collected By: J. BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	9/9/2013	1556	MCF
Alkalinity		229	mg/l CaCO3	1.00	1.00	SM 2320B-2011	9/9/2013	1317	MCF
Alkalinity, CO3	Not NELAP	1.86	mg/l	0.100		4500-CO2-D	9/11/2013	1150	SAS
Alkalinity, HC03	Not NELAP	227	mg/l	0.100		4500-CO2-D	9/11/2013	1150	SAS
Bromide		$0.060 \; {\rm J}$	mg/l	0.020	0.200	EPA 300.0	9/12/2013	1843	KMC
Chloride		0.858	mg/l	0.055	0.500	EPA 300.0	9/10/2013	1544	KMC
Conductivity		1380	umhos/cm	1.00	1.00	SM 2510B-2011	9/6/2013	1137	THR
Flow, Measured	Not NELAP	2285	gpm				9/5/2013	1420	FLD
Hardness, Total		484	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	9/9/2013	1316	SAS
Nitrate		0.328	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1317	KMC
Nitrite		0.112 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1317	KMC
рН	Not NELAP	7.94	STD			SM 4500-H+B-2011	9/5/2013	1420	FLD
Sulfate		428	mg/l	1.03	5.00	EPA 300.0	9/10/2013	1544	KMC
Total Dissolved Solids		958	mg/l	1.00	1.00	SM 2540C-2011	9/6/2013	1016	JRS
Total Suspended Solids		4.90	mg/l	1.00	1.00	SM 2540 D-2011	9/5/2013	2204	BAB

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136. This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038 WV Laboratory ID#: 105 EPA Laboratory ID#: VA00010 The release of this report is authorized by:

R. J. Porter **Technical Director**

Flow if Avaliable (GPM):

Temp. if Available (C):

Depth if Available (Ft):

2285.0 17.9

Type of Sample: Grab

BDL = Below Detection Limit

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result IV = Flag indicates Insufficient Sample Volume SV = Sample volume indicated by method not used

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance

PSCN

Rev-7-25-13



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Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1101760 - BRFK1

Site Description:

NORTON, VA

24273

Report Date: 09/18/13

Lab Sample No.: 1359592

Client No.: 95

EMI Project No.: 97

Date Collected: 09/05/13
Time Collected: 1420
Sample Matrix: AQ

	Sample					Date	Time	
Parameter	Result	Units	MDL	RL	Method	Analyzed	Analyzed	Analyst
Aluminum, Total	0.088	mg/l	0.0016	0.050	200.7	9/9/2013	1327	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/13/2013	1646	CLS
Arsenic, Total	0.243 J	ug/l	0.154	2.00	200.8	9/13/2013	1646	CLS
Barium, Total	29.3	ug/l	0.171	2.00	200.8	9/13/2013	1646	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/13/2013	1646	CLS
Boron, Total	0.017 J	mg/l	0.0061	0.030	200.7	9/10/2013	1346	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/13/2013	1646	CLS
Chromium, Total	0.223 J	ug/l	0.098	2.00	200.8	9/13/2013	1646	CLS
Cobalt, Total	0.315 J	ug/l	0.143	2.00	200.8	9/13/2013	1646	CLS
Copper, Total	0.626 J	ug/l	0.080	2.00	200.8	9/13/2013	1646	CLS
Iron, Total	0.454	mg/l	0.0089	0.050	200.7	9/9/2013	1327	AWM
Lead, Total	0.152 J	ug/l	0.054	2.00	200.8	9/13/2013	1646	CLS
Magnesium, Total	52.9	mg/l	0.032	0.500	EPA 200.7	9/9/2013	1231	AWM
Manganese, Total	0.131	mg/l	0.0023	0.050	200.7	9/9/2013	1327	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/6/2013	1216	SAS
Nickel, Total	0.642 J	ug/l	0.169	2.00	200.8	9/13/2013	1646	CLS
Selenium, Total	0.839 J	ug/l	0.731	2.00	200.8	9/13/2013	1646	CLS



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Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1101760 - BRFK1

Site Description:

NORTON, VA

24273

Report Date: 09/18/13 $Lab\ Sample\ No.:\ 1359592$

Client No.: 95

EMI Project No.: 97

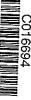
Date Collected: 09/05/13

Time Collected: 1420 Sample Matrix: AQ

	Sample					Date	Time	
Parameter	Result	Units	MDL	RL	Method	Analyzed	Analyzed	Analyst
011 m + 1	DD1	/1	0.101	2.00	200.0	0/12/2012	1646	CI C
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/13/2013	1646	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/13/2013	1646	CLS
Zinc, Total	4.17 J	ug/l	0.328	10.0	200.8	9/14/2013	1501	CLS

Log Sheet __i_ of }__





CONTROL ACCOUNTS SAMPLE LOG SHEET & CHAIN OF CUSTODY

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STATE/ZIP	-							Γ	16544	P.O. Box 1190 A Norton, Virginia 24273 A 276-679-6544	. Norton, Virgin	P.O. Box 1190 🛦	
*	СІТҮ;						*CONTACT:_	°,	BORATORIES	ENVIRONMENTAL CONSULTANTS A ANALYTICAL LABORATORIES	NSULTANTS A	RONMENTAL CON	NA Circle
BILLING ADDRESS:	ADD ADD	Kuscuso	Copy	(00)	River	Red R	*CLIENT:_R	°,	RPORATED	ENVIRONMENTAL MONITORING INCORPORATED	MONITO	ONIMENTAI	
CUSTOMER INFORMATION: Shaded Areas · LAB INFORMATION: White Areas	reas · LAE	Shaded #	NOIT:	FORM	MER IN	OTSU			٤	SERVICES	OROFESSIONAL S	PRO	



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Site Description: 1101760

NORTON, VA

24273

Lab Sample No.: 1360005

Report Date: 10/04/13

Client No.: EMI Project No.: 97

Sample Identification: 1199.01-BRFK2 Date Collected: 09/06/13

> Time Collected: 825 Sample Matrix: AO

Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	9/10/2013	1342	MCF
Alkalinity		202	mg/l CaCO3	1.00	1.00	SM 2320B-2011	9/10/2013	1117	MCF
Alkalinity, CO3	Not NELAP	2.70	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Alkalinity, HC03	Not NELAP	199	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Bromide		0.060 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1647	JLW
Chloride		1.60	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1713	KMC
Conductivity		1491	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1019	THR
Flow, Measured	Not NELAP	3352	gpm				9/6/2013	825	FLD
Hardness, Total		580	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate		0.382	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1524	KMC
Nitrite		0.083 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1524	KMC
рН	Not NELAP	8.16	STD			SM 4500-H+B-2011	9/6/2013	825	FLD
Sulfate		480	mg/l	1.03	5.00	EPA 300.0	9/12/2013	1713	KMC
Total Dissolved Solids		956	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1015	JRS
Total Suspended Solids		15.9	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2045	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136. This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038 WV Laboratory ID#: 105 EPA Laboratory ID#: VA00010 The release of this report is authorized by:

R. J. Porter **Technical Director**

Flow if Avaliable (GPM):

3352.0 17.1

Type of Sample: Grab

BDL = Below Detection Limit FLD = Field Technician

Temp. if Available (C): Depth if Available (Ft): Analysis Package Code:

EPA0902R

MR = Multiple analytical runs were used for this result

IV = Flag indicates Insufficient Sample Volume SV = Sample volume indicated by method not used J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance

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ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1199.01-BRFK2

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360005

Client No.: 95

EMI Project No.: 97

Date Collected: 09/06/13 Time Collected: 825 Sample Matrix: AQ

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.286	mg/l	0.0016	0.050	200.7	9/10/2013	1759	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/17/2013	2327	CLS
Arsenic, Total	0.363 J	ug/l	0.154	2.00	200.8	9/17/2013	2327	CLS
Barium, Total	34.8	ug/l	0.171	2.00	200.8	9/17/2013	2327	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/17/2013	2327	CLS
Boron, Total	0.017 J	mg/l	0.0061	0.030	200.7	9/10/2013	1434	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/17/2013	2327	CLS
Chromium, Total	0.430 J	ug/l	0.098	2.00	200.8	9/17/2013	2327	CLS
Cobalt, Total	0.514 J	ug/l	0.143	2.00	200.8	9/17/2013	2327	CLS
Copper, Total	0.937 J	ug/l	0.080	2.00	200.8	9/17/2013	2327	CLS
Iron, Total	0.649	mg/l	0.0089	0.050	200.7	9/10/2013	1759	AWM
Lead, Total	0.393 J	ug/l	0.054	2.00	200.8	9/17/2013	2327	CLS
Magnesium, Total	61.5	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1135	AWM
Manganese, Total	0.112	mg/l	0.0023	0.050	200.7	9/10/2013	1759	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	1.22 J	ug/l	0.169	2.00	200.8	9/17/2013	2327	CLS
Selenium, Total	1.51 J	ug/l	0.731	2.00	200.8	9/17/2013	2327	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360005

Client No.: 95 EMI Project No.: 97

Sample Identification: 1199.01-BRFK2 Date Collected: 09/06/13

Time Collected: 825
Sample Matrix: AQ

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/17/2013	2327	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/17/2013	2327	CLS
Zinc. Total	5.57 J	ug/l	0.328	10.0	200.8	9/17/2013	2327	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360006

Client No.: EMI Project No.: 97

Sample Identification: 1199.01-BRFK3 Date Collected: 09/06/13

Time Collected: 900 Sample Matrix: AO

Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	9/10/2013	1345	MCF
Alkalinity		200	mg/l CaCO3	1.00	1.00	SM 2320B-2011	9/10/2013	1121	MCF
Alkalinity, CO3	Not NELAP	4.50	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Alkalinity, HC03	Not NELAP	195	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Bromide		0.060 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1702	JLW
Chloride		1.35	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1724	KMC
Conductivity		1452	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1019	THR
Flow, Measured	Not NELAP	2593	gpm				9/6/2013	900	FLD
Hardness, Total		580	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate		0.405	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1539	KMC
Nitrite		0.098 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1539	KMC
pH	Not NELAP	8.39	STD			SM 4500-H+B-2011	9/6/2013	900	FLD
Sulfate		495	mg/l	1.03	5.00	EPA 300.0	9/12/2013	1724	KMC
Total Dissolved Solids		950	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1017	JRS
Total Suspended Solids		16.5	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2051	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136. This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038 WV Laboratory ID#: 105 EPA Laboratory ID#: VA00010 The release of this report is authorized by:

R. J. Porter **Technical Director**

Flow if Avaliable (GPM):

2593.0

Type of Sample: Grab

16.9

BDL = Below Detection Limit FLD = Field Technician

Temp. if Available (C): Depth if Available (Ft):

EPA0902R

MR = Multiple analytical runs were used for this result IV = Flag indicates Insufficient Sample Volume

SV = Sample volume indicated by method not used

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance

Analysis Package Code:

PSCN

Rev-7-25-13



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1199.01-BRFK3

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360006

Client No.: 95

EMI Project No.: 97

Date Collected: 09/06/

Date Collected: 09/06/13 Time Collected: 900 Sample Matrix: AQ

	Sample					Date	Time	
Parameter	Result	Units	MDL	RL	Method	Analyzed	Analyzed	Analyst
Aluminum, Total	0.261	mg/l	0.0016	0.050	200.7	9/10/2013	1804	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/14/2013	1732	CLS
Arsenic, Total	0.312 J	ug/l	0.154	2.00	200.8	9/14/2013	1732	CLS
Barium, Total	35.3	ug/l	0.171	2.00	200.8	9/14/2013	1732	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/14/2013	1732	CLS
Boron, Total	0.015 J	mg/l	0.0061	0.030	200.7	9/10/2013	1437	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/14/2013	1732	CLS
Chromium, Total	0.395 J	ug/l	0.098	2.00	200.8	9/14/2013	1732	CLS
Cobalt, Total	0.428 J	ug/l	0.143	2.00	200.8	9/14/2013	1732	CLS
Copper, Total	0.902 J	ug/l	0.080	2.00	200.8	9/14/2013	1732	CLS
Iron, Total	0.590	mg/l	0.0089	0.050	200.7	9/10/2013	1804	AWM
Lead, Total	0.342 J	ug/l	0.054	2.00	200.8	9/14/2013	1732	CLS
Magnesium, Total	62.2	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1140	AWM
Manganese, Total	0.095	mg/l	0.0023	0.050	200.7	9/10/2013	1804	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	1.16 J	ug/l	0.169	2.00	200.8	9/14/2013	1732	CLS
Selenium, Total	1.62 J	ug/l	0.731	2.00	200.8	9/14/2013	1732	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Site Description: 1101760

NORTON, VA

24273

Lab Sample No.: **1360006**

Client No.: 95 EMI Project No.: 97

Report Date: 10/04/13

Sample Identification: 1199.01-BRFK3 Date Collected: 09/06/13

Time Collected: 900 Sample Matrix: AQ

	Sample	T T •4	MDI	DI	Mr. d. J.	Date	Time	
Parameter	Result	Units	MDL	RL	Method	Analyzed	Analyzed	Analyst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/14/2013	1732	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/14/2013	1732	CLS
Zinc. Total	3.81 J	ug/l	0.328	10.0	200.8	9/17/2013	1345	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1199.01-BRFK4

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360007

Client No.:

EMI Project No.: 97

Date Collected: 09/06/13

Time Collected: 955 Sample Matrix: AO

Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	9/10/2013	1348	MCF
Alkalinity		193	mg/l CaCO3	1.00	1.00	SM 2320B-2011	9/10/2013	1124	MCF
Alkalinity, CO3	Not NELAP	4.40	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Alkalinity, HC03	Not NELAP	188	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Bromide		0.050 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1718	JLW
Chloride		1.34	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1735	KMC
Conductivity		1471	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1020	THR
Flow, Measured	Not NELAP	3645	gpm				9/6/2013	955	FLD
Hardness, Total		644	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate		0.597	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1555	KMC
Nitrite		0.100 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1555	KMC
рН	Not NELAP	8.40	STD			SM 4500-H+B-2011	9/6/2013	955	FLD
Sulfate		456	mg/l	2.07	10.0	EPA 300.0	9/20/2013	2057	KMC
Total Dissolved Solids		1038	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1020	JRS
Total Suspended Solids		10.1	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2054	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136. This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038 WV Laboratory ID#: 105 EPA Laboratory ID#: VA00010 The release of this report is authorized by:

R. J. Porter **Technical Director**

Flow if Avaliable (GPM):

3645.0

Type of Sample: Grab BDL = Below Detection Limit

Temp. if Available (C):

16.5

FLD = Field Technician

Depth if Available (Ft): Analysis Package Code:

EPA0902R

MR = Multiple analytical runs were used for this result IV = Flag indicates Insufficient Sample Volume SV = Sample volume indicated by method not used

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance

PSCN

Rev-7-25-13



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1199.01-BRFK4

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360007

Client No.: 95

EMI Project No.: 97

Date Collected: 09/06/13 Time Collected: 955 Sample Matrix: AQ

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.138	mg/l	0.0016	0.050	200.7	9/10/2013	1802	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/14/2013	1727	CLS
Arsenic, Total	0.263 J	ug/l	0.154	2.00	200.8	9/14/2013	1727	CLS
Barium, Total	36.0	ug/l	0.171	2.00	200.8	9/14/2013	1727	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/14/2013	1727	CLS
Boron, Total	0.014 J	mg/l	0.0061	0.030	200.7	9/10/2013	1440	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/14/2013	1727	CLS
Chromium, Total	0.215 J	ug/l	0.098	2.00	200.8	9/14/2013	1727	CLS
Cobalt, Total	0.427 J	ug/l	0.143	2.00	200.8	9/14/2013	1727	CLS
Copper, Total	0.638 J	ug/l	0.080	2.00	200.8	9/14/2013	1727	CLS
Iron, Total	0.350	mg/l	0.0089	0.050	200.7	9/10/2013	1802	AWM
Lead, Total	0.197 J	ug/l	0.054	2.00	200.8	9/14/2013	1727	CLS
Magnesium, Total	65.5	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1158	AWM
Manganese, Total	0.089	mg/l	0.0023	0.050	200.7	9/10/2013	1802	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	1.02 J	ug/l	0.169	2.00	200.8	9/14/2013	1727	CLS
Selenium, Total	2.31	ug/l	0.731	2.00	200.8	9/14/2013	1727	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1199.01-BRFK4

Site Description: 1101760

NORTON, VA

242

24273

Lab Sample No.: **1360007**Client No.: 95

EMI Project No.: 95

Report Date: 10/04/13

Date Collected: 09/06/13

Time Collected: 955
Sample Matrix: AQ

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
1 at ameter	Result	Cints	MDL	KL	Method	Maryzeu	Manyzed	rmaryst
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/14/2013	1727	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/14/2013	1727	CLS
Zinc, Total	4.35 J	ug/l	0.328	10.0	200.8	9/17/2013	1340	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 1 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360008

Client No.: EMI Project No.: 97

Sample Identification: 1199.01-BCPT-1 Date Collected: 09/06/13

> Time Collected: 1040 Sample Matrix: AQ

Collected By: J BREEDING

Parameter		Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Acidity, Hot		BDL	mg/l CaCO3	1.00	1.00	SM 2310B-2011	9/10/2013	1351	MCF
Alkalinity		214	mg/l CaCO3	1.00	1.00	SM 2320B-2011	9/10/2013	1128	MCF
Alkalinity, CO3	Not NELAP	2.93	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Alkalinity, HC03	Not NELAP	211	mg/l	0.100		4500-CO2-D	9/10/2013	1128	MCF
Bromide		0.050 J	mg/l	0.020	0.200	EPA 300.0	10/2/2013	1734	JLW
Chloride		1.08	mg/l	0.055	0.500	EPA 300.0	9/12/2013	1746	KMC
Conductivity		1014	umhos/cm	1.00	1.00	SM 2510B-2011	9/11/2013	1021	THR
Flow, Measured	Not NELAP	475	gpm				9/6/2013	1040	FLD
Hardness, Total		440	mg/l CaCO3	4.00	4.00	SM 2340 C-2011	9/9/2013	1335	SAS
Nitrate		1.32	mg/l	0.012	0.200	EPA 300.0	9/6/2013	1611	KMC
Nitrite		0.088 J	mg/l	0.016	0.200	EPA 300.0	9/6/2013	1611	KMC
pН	Not NELAP	8.17	STD			SM 4500-H+B-2011	9/6/2013	1040	FLD
Sulfate		287	mg/l	1.03	5.00	EPA 300.0	9/12/2013	1746	KMC
Total Dissolved Solids		700	mg/l	1.00	1.00	SM 2540C-2011	9/9/2013	1021	JRS
Total Suspended Solids		2.20	mg/l	1.00	1.00	SM 2540 D-2011	9/6/2013	2134	MLS

To the best of our knowledge and belief, the collection, preservation, and analysis of all parameters represented by this report have been determined to comply the requirements as specified in 40 CFR, Part 136. This report may not be reproduced except in full, without the written approval of the laboratory.



VA Laboratory ID#: 460038 WV Laboratory ID#: 105 EPA Laboratory ID#: VA00010 The release of this report is authorized by:

R. J. Porter **Technical Director**

Flow if Avaliable (GPM): 475.0

Type of Sample: Grab

19.7

BDL = Below Detection Limit

Temp. if Available (C): Depth if Available (Ft):

FLD = Field Technician

Analysis Package Code: EPA0902R

MR = Multiple analytical runs were used for this result IV = Flag indicates Insufficient Sample Volume SV = Sample volume indicated by method not used

J = Flag indicates estimated value below Report Limit

T = Results indicate possible toxicity which is expected to influence reported value.

NA = A result for this analyte is not available.

MI = Matrix Interference - Final result may not be representative.

BQ = Batch QC Outside Acceptable Range

HE = Parameter Hold Time Exceeded FC = Failure to Comply Current SOP

R = Sample results rejected because of gross deficiencies in QC or method performance

PSCN Rev-7-25-13



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

24273

Page: 2 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

NORTON, VA

Sample Identification: 1199.01-BCPT-1

Site Description: 1101760

Report Date: 10/04/13

Lab Sample No.: 1360008

Client No.: 95

EMI Project No.: 97

Date Collected: 09/06/13 Time Collected: 1040 Sample Matrix: AQ

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
Aluminum, Total	0.052	mg/l	0.0016	0.050	200.7	9/10/2013	1801	AWM
Antimony, Total	BDL	ug/l	0.113	2.00	200.8	9/14/2013	1810	CLS
Arsenic, Total	0.311 J	ug/l	0.154	2.00	200.8	9/14/2013	1810	CLS
Barium, Total	101	ug/l	0.171	2.00	200.8	9/14/2013	1810	CLS
Beryllium, Total	BDL	ug/l	0.078	2.00	200.8	9/14/2013	1810	CLS
Boron, Total	0.011 J	mg/l	0.0061	0.030	200.7	9/10/2013	1444	AWM
Cadmium, Total	BDL	ug/l	0.154	2.00	200.8	9/14/2013	1810	CLS
Chromium, Total	0.098 J	ug/l	0.098	2.00	200.8	9/14/2013	1810	CLS
Cobalt, Total	0.178 J	ug/l	0.143	2.00	200.8	9/14/2013	1810	CLS
Copper, Total	0.445 J	ug/l	0.080	2.00	200.8	9/14/2013	1810	CLS
Iron, Total	0.341	mg/l	0.0089	0.050	200.7	9/10/2013	1801	AWM
Lead, Total	0.074 J	ug/l	0.054	2.00	200.8	9/14/2013	1810	CLS
Magnesium, Total	52.7	mg/l	0.032	0.500	EPA 200.7	9/10/2013	1144	AWM
Manganese, Total	0.117	mg/l	0.0023	0.050	200.7	9/10/2013	1801	AWM
Mercury, Total	BDL	ug/l	0.078	0.500	EPA 245.1-REV.3	9/11/2013	1052	SAS
Nickel, Total	0.658 J	ug/l	0.169	2.00	200.8	9/14/2013	1810	CLS
Selenium, Total	2.71	ug/l	0.731	2.00	200.8	9/14/2013	1810	CLS



ENVIRONMENTAL CONSULTANTS ▲ ANALYTICAL LABORATORIES P.O. BOX 1190 ▲ NORTON, VIRGINIA 24273 ▲ 276/679-6544

Certificate of Analysis

Page: 3 of 3

Client Name: RED RIVER COAL COMPANY

Address: P.O. BOX 668

Sample Identification: 1199.01-BCPT-1

Site Description: 1101760

NORTON, VA

24273

Report Date: 10/04/13

Lab Sample No.: 1360008

Client No.: 95

EMI Project No.: 97

Date Collected: 09/06/13
Time Collected: 1040
Sample Matrix: AQ

Parameter	Sample Result	Units	MDL	RL	Method	Date Analyzed	Time Analyzed	Analyst
								-
Silver, Total	BDL	ug/l	0.101	2.00	200.8	9/14/2013	1810	CLS
Thallium, Total	BDL	ug/l	0.076	2.00	200.8	9/14/2013	1810	CLS
Zinc, Total	2.03 J	ug/l	0.328	10.0	200.8	9/17/2013	1546	CLS

Log Sheet ____of ___





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THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica Savannah 5102 LaRoche Avenue Savannah, GA 31404 Tel: (912)354-7858

TestAmerica Job ID: 680-94059-3

Client Project/Site: 95.97

For:

Environmental Monitoring, Inc. 5730 Industrial Park Rd. Norton, Virginia 24273

Attn: Donna Phillips

Authorized for release by: 9/18/2013 2:56:50 PM

Sheila Hoffman, Project Manager I sheila.hoffman@testamericainc.com

.....LINKS

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Have a Question?



Visit us at: www.testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Client: Environmental Monitoring, Inc. Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Table of Contents

Cover Page	1
Table of Contents	2
Sample Summary	3
Method Summary	4
Definitions	5
Client Sample Results	6
QC Sample Results	8
QC Association	10
Chronicle	12
Chain of Custody	14
Receipt Checklists	15
Certification Summary	16

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Sample Summary

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
680-94059-5	1359591	Water	09/05/13 13:20	09/10/13 10:32
680-94059-6	1359592	Water	09/05/13 14:20	09/10/13 10:32
680-94059-7	1360005	Water	09/06/13 08:25	09/10/13 10:32
680-94059-8	1360006	Water	09/06/13 09:00	09/10/13 10:32
680-94059-9	1360007	Water	09/06/13 09:55	09/10/13 10:32
680-94059-10	1360008	Water	09/06/13 10:40	09/10/13 10:32

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Method Summary

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Method	Method Description	Protocol	Laboratory
335.4	Cyanide, Total	MCAWW	TAL SAV
420.1	Phenolics, Total Recoverable	MCAWW	TAL SAV
SM 5310B	Organic Carbon, Dissolved (DOC)	SM	TAL SAV

Protocol References:

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions. SM = "Standard Methods For The Examination Of Water And Wastewater",

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

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Definitions/Glossary

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Qualifiers

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
U	Indicates the analyte was analyzed for but not detected.

Glossary

ND PQL

QC RER

RL

RPD

TEF

TEQ

These commonly used abbreviations may or may not be present in this report.
Listed under the "D" column to designate that the result is reported on a dry weight basis
Percent Recovery
Contains no Free Liquid
Duplicate error ratio (normalized absolute difference)
Dilution Factor
Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
Decision level concentration
Minimum detectable activity
Estimated Detection Limit
Minimum detectable concentration
Method Detection Limit
Minimum Level (Dioxin)
Not Calculated

Not detected at the reporting limit (or MDL or EDL if shown)

Relative Percent Difference, a measure of the relative difference between two points

Reporting Limit or Requested Limit (Radiochemistry)

Practical Quantitation Limit

Toxicity Equivalent Factor (Dioxin)

Toxicity Equivalent Quotient (Dioxin)

Quality Control

Relative error ratio

TestAmerica Savannah

Project/Site: 95.97

Client Sample ID: 1359591 -1101760 - BPR1 Lab Sample ID: 680-94059-5

Date Collected: 09/05/13 13:20 Matrix: Water

Date Received: 09/10/13 10:32

Client: Environmental Monitoring, Inc.

General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		09/11/13 07:36	09/12/13 10:42	1
Phenolics, Total Recoverable	0.031	J	0.050	0.025	mg/L		09/12/13 10:27	09/13/13 10:47	1
General Chemistry - Dissolved	Pacult	Ovelities.	DI.	MDI	l l = i4	ь	Drawavad	Analysed	Dil Fac
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.4		1.0	0.50	mg/L			09/18/13 08:19	1

Client Sample ID: 1359592 -1101760 - BRFK1 Lab Sample ID: 680-94059-6

Date Collected: 09/05/13 14:20 Matrix: Water

Date Received: 09/10/13 10:32

General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		09/11/13 07:36	09/12/13 10:43	1
Phenolics, Total Recoverable	0.028	J	0.050	0.025	mg/L		09/12/13 10:27	09/13/13 10:47	1
General Chemistry - Dissolved									

Analyte RLMDL Unit Result Qualifier Prepared Analyzed Dil Fac **Dissolved Organic Carbon** 1.0 0.50 mg/L 09/17/13 19:07

Client Sample ID: 1360005 -1199.01-BRFK2 Lab Sample ID: 680-94059-7

Date Collected: 09/06/13 08:25 Date Received: 09/10/13 10:32

General Chemistry Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0038	J	0.010	0.0025	mg/L		09/11/13 07:36	09/12/13 10:44	1
Phenolics, Total Recoverable	0.025	U	0.050	0.025	mg/L		09/12/13 10:27	09/13/13 10:47	1
General Chemistry - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.5		1.0	0.50	mg/L			09/17/13 19:25	1

Client Sample ID: 1360006 -1199.01-BRFK3 Lab Sample ID: 680-94059-8

Date Collected: 09/06/13 09:00 Matrix: Water Date Received: 09/10/13 10:32

General Chemistry	Daniel	O	D.	MDI	1114		Dunama d	A I d	D!! E-
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fa
Cyanide, Total	0.0033	J	0.010	0.0025	mg/L		09/11/13 09:30	09/12/13 10:47	
Phenolics, Total Recoverable	0.043	J	0.050	0.025	mg/L		09/12/13 10:27	09/13/13 10:47	
General Chemistry - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil F
Dissolved Organic Carbon	1.2		1.0	0.50	mg/L			09/17/13 19:42	

TestAmerica Savannah

Matrix: Water

Client Sample Results

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Lab Sample ID: 680-94059-9

ab campic ib. 000-34003-3

09/17/13 20:14

Matrix: Water

Client Sample ID: 1360007 -1199.01-BRFK4
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1100 01 DDDICA

2.8

Date Collected: 09/06/13 09:55 Date Received: 09/10/13 10:32

General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0025	U	0.010	0.0025	mg/L		09/11/13 09:30	09/12/13 10:53	1
Phenolics, Total Recoverable	0.036	J	0.050	0.025	mg/L		09/12/13 10:27	09/13/13 10:47	1

General Chemistry - Dissolved										
Analyte	Result	Qualifier	RL	MDL	Unit	D	Pre	pared	Analyzed	Dil Fac
Dissolved Organic Carbon	1.6		1.0	0.50	mg/L				09/17/13 19:56	1

Client Sample ID: 1360008 -1199 . 01-BCPT-1 Lab Sample ID: 680-94059-10

Date Collected: 09/06/13 10:40 Matrix: Water

Date Received: 09/10/13 10:32

Dissolved Organic Carbon

General Chemistry									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.0029	J	0.010	0.0025	mg/L		09/11/13 09:30	09/12/13 10:54	1
Phenolics, Total Recoverable	0.033	J	0.050	0.025	mg/L		09/12/13 10:27	09/13/13 10:47	1
General Chemistry - Dissolved									
Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac

1.0

0.50 mg/L

4

5

7

10

11

Client Sample ID: Method Blank

Client Sample ID: Lab Control Sample

Limits

90 - 110

Client Sample ID: Method Blank

Analyzed

09/12/13 10:45

Client Sample ID: Lab Control Sample

%Rec.

Limits

90 - 110

%Rec.

Limits

%Rec.

Limits

90 - 110

90 - 110

%Rec

Prepared

09/11/13 09:30

%Rec

%Rec

%Rec

103

97

D

D

99

95

Prep Type: Total/NA

Prep Batch: 293120

Prep Type: Total/NA

Prep Batch: 293120

Prep Type: Total/NA

Prep Batch: 293162

Prep Type: Total/NA

Prep Batch: 293162

Client Sample ID: 1360006

Client Sample ID: 1360006

Prep Type: Total/NA

Prep Batch: 293162

RPD

RPD

Limit

20

Prep Type: Total/NA

Prep Batch: 293162

Dil Fac

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

Method: 335.4 - Cyanide, Total

Lab Sample ID: MB 680-293120/1-A

Matrix: Water

Analysis Batch: 293439

мв мв

Sample Sample

Sample Sample

0.025 U

0.0033

Result Qualifier

RL Result Qualifier MDL Unit D Dil Fac Analyte Prepared Analyzed 0.010 09/11/13 07:36 Cyanide, Total 0.0025 U 0.0025 mg/L 09/12/13 10:12

RL

0.010

Spike

Added

0.0500

Spike

Added

0.0500

Spike

Added

0.0500

Spike

Added

0.0500

LCS LCS

0.0475

Result Qualifier

MDL Unit

0.0025 mg/L

LCS LCS

MS MS

MSD MSD

Result Qualifier

Result Qualifier

0.0495

0.0516

0.0549

Result Qualifier

Unit

mg/L

Unit

ma/L

Unit

mg/L

Unit

mg/L

D

Lab Sample ID: LCS 680-293120/2-A

Matrix: Water

Analysis Batch: 293439

Analyte Cyanide, Total

Lab Sample ID: MB 680-293162/1-A

Matrix: Water

Analysis Batch: 293439

мв мв

Result Qualifier

0.00343 Cyanide, Total

Lab Sample ID: LCS 680-293162/2-A

Matrix: Water

Analysis Batch: 293439

Analyte

Lab Sample ID: 680-94059-8 MS

Matrix: Water

Analyte

Cyanide, Total

Analysis Batch: 293439

Cyanide, Total

Lab Sample ID: 680-94059-8 MSD

Matrix: Water

Analysis Batch: 293439

Result Qualifier Analyte Cyanide, Total 0.0033 J

Method: 420.1 - Phenolics, Total Recoverable

Lab Sample ID: MB 680-293431/1-A

Matrix: Water

Analysis Batch: 293673

MB MB

Analyte

Phenolics, Total Recoverable

Result Qualifier RL MDL Unit

0.050

0.025 mg/L

Prepared 09/12/13 10:27

Analyzed

09/13/13 10:47

Client Sample ID: Method Blank

Dil Fac

Prep Type: Total/NA

Prep Batch: 293431

TestAmerica Savannah

TestAmerica Job ID: 680-94059-3

Project/Site: 95.97

Client: Environmental Monitoring, Inc.

Method: 420.1 - Phenolics, Total Recoverable (Continued)

Lab Sample ID: LCS 680-293431/2-A **Client Sample ID: Lab Control Sample Matrix: Water** Prep Type: Total/NA Analysis Batch: 293673 Prep Batch: 293431 Spike LCS LCS

Added Analyte Result Qualifier Limits Unit D %Rec 0.250 Phenolics, Total Recoverable 0.246 mg/L 98 75 - 125

Method: SM 5310B - Organic Carbon, Dissolved (DOC)

Lab Sample ID: MB 680-294041/2-A Client Sample ID: Method Blank **Matrix: Water Prep Type: Dissolved**

Analysis Batch: 294378

мв мв Analyte Result Qualifier RL MDL Unit D Prepared Analyzed Dil Fac Dissolved Organic Carbon 0.50 U 1.0 0.50 mg/L 09/18/13 02:00

Lab Sample ID: LCS 680-294041/1-A **Client Sample ID: Lab Control Sample Matrix: Water Prep Type: Dissolved** Analysis Batch: 294378

LCS LCS %Rec. Spike Analyte Added Result Qualifier Unit %Rec Limits Dissolved Organic Carbon 20.0 19.1 mg/L 95 80 - 120 DOC Result 3 20.0 19.0 mg/L 95 80 - 120 DOC Result 2 20.0 19.1 mg/L 96 80 - 120 DOC Result 1 80 - 120

20.0

Client Sample ID: 1359591 Lab Sample ID: 680-94059-5 DU **Matrix: Water Prep Type: Dissolved**

19.1

mg/L

Analysis Batch: 294378

Sample Sample DU DU RPD Result Qualifier Result Qualifier RPD Limit Analyte Unit Dissolved Organic Carbon 1.3 1.27 mg/L 0.6 30

TestAmerica Savannah

TestAmerica Job ID: 680-94059-3

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

General Chemistry

Prep Batch: 293120

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	Distill/CN	
680-94059-6	1359592	Total/NA	Water	Distill/CN	
680-94059-7	1360005	Total/NA	Water	Distill/CN	
LCS 680-293120/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 680-293120/1-A	Method Blank	Total/NA	Water	Distill/CN	

Prep Batch: 293162

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-8	1360006	Total/NA	Water	Distill/CN	
680-94059-8 MS	1360006	Total/NA	Water	Distill/CN	
680-94059-8 MSD	1360006	Total/NA	Water	Distill/CN	
680-94059-9	1360007	Total/NA	Water	Distill/CN	
680-94059-10	1360008	Total/NA	Water	Distill/CN	
LCS 680-293162/2-A	Lab Control Sample	Total/NA	Water	Distill/CN	
MB 680-293162/1-A	Method Blank	Total/NA	Water	Distill/CN	

Prep Batch: 293431

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	Distill/Phenol	
680-94059-6	1359592	Total/NA	Water	Distill/Phenol	
680-94059-7	1360005	Total/NA	Water	Distill/Phenol	
680-94059-8	1360006	Total/NA	Water	Distill/Phenol	
680-94059-9	1360007	Total/NA	Water	Distill/Phenol	
680-94059-10	1360008	Total/NA	Water	Distill/Phenol	
LCS 680-293431/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 680-293431/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Analysis Batch: 293439

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	335.4	293120
680-94059-6	1359592	Total/NA	Water	335.4	293120
680-94059-7	1360005	Total/NA	Water	335.4	293120
680-94059-8	1360006	Total/NA	Water	335.4	293162
680-94059-8 MS	1360006	Total/NA	Water	335.4	293162
680-94059-8 MSD	1360006	Total/NA	Water	335.4	293162
680-94059-9	1360007	Total/NA	Water	335.4	293162
680-94059-10	1360008	Total/NA	Water	335.4	293162
LCS 680-293120/2-A	Lab Control Sample	Total/NA	Water	335.4	293120
LCS 680-293162/2-A	Lab Control Sample	Total/NA	Water	335.4	293162
MB 680-293120/1-A	Method Blank	Total/NA	Water	335.4	293120
MB 680-293162/1-A	Method Blank	Total/NA	Water	335.4	293162

Analysis Batch: 293673

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Total/NA	Water	420.1	293431
680-94059-6	1359592	Total/NA	Water	420.1	293431
680-94059-7	1360005	Total/NA	Water	420.1	293431
680-94059-8	1360006	Total/NA	Water	420.1	293431
680-94059-9	1360007	Total/NA	Water	420.1	293431
680-94059-10	1360008	Total/NA	Water	420.1	293431
LCS 680-293431/2-A	Lab Control Sample	Total/NA	Water	420.1	293431

TestAmerica Savannah

Page 10 of 16

QC Association Summary

 ${\bf Client: Environmental\ Monitoring,\ Inc.}$

Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

General Chemistry (Continued)

Analysis Batch: 293673 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 680-293431/1-A	Method Blank	Total/NA	Water	420.1	293431

Filtration Batch: 294041

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Dissolved	Water	FILTRATION	
680-94059-5 DU	1359591	Dissolved	Water	FILTRATION	
680-94059-6	1359592	Dissolved	Water	FILTRATION	
680-94059-7	1360005	Dissolved	Water	FILTRATION	
680-94059-8	1360006	Dissolved	Water	FILTRATION	
680-94059-9	1360007	Dissolved	Water	FILTRATION	
680-94059-10	1360008	Dissolved	Water	FILTRATION	
LCS 680-294041/1-A	Lab Control Sample	Dissolved	Water	FILTRATION	
MB 680-294041/2-A	Method Blank	Dissolved	Water	FILTRATION	

Analysis Batch: 294376

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5	1359591	Dissolved	Water	SM 5310B	294041

Analysis Batch: 294378

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
680-94059-5 DU	1359591	Dissolved	Water	SM 5310B	294041
680-94059-6	1359592	Dissolved	Water	SM 5310B	294041
680-94059-7	1360005	Dissolved	Water	SM 5310B	294041
680-94059-8	1360006	Dissolved	Water	SM 5310B	294041
680-94059-9	1360007	Dissolved	Water	SM 5310B	294041
680-94059-10	1360008	Dissolved	Water	SM 5310B	294041
LCS 680-294041/1-A	Lab Control Sample	Dissolved	Water	SM 5310B	294041
MB 680-294041/2-A	Method Blank	Dissolved	Water	SM 5310B	294041

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Client: Environmental Monitoring, Inc.

Project/Site: 95.97

Lab Sample ID: 680-94059-5

Matrix: Water

Client Sample ID: 1359591 Date Collected: 09/05/13 13:20 Date Received: 09/10/13 10:32

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293120	09/11/13 07:36	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:42	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294376	09/18/13 08:19	CMP	TAL SAV

Client Sample ID: 1359592 Lab Sample ID: 680-94059-6

Date Collected: 09/05/13 14:20 Matrix: Water

Date Received: 09/10/13 10:32

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293120	09/11/13 07:36	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:43	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:07	CMP	TAL SAV

Client Sample ID: 1360005 Lab Sample ID: 680-94059-7

Date Collected: 09/06/13 08:25 Date Received: 09/10/13 10:32

Filtration

Analysis

FILTRATION

SM 5310B

Dissolved

Dissolved

Batch Dilution Batch Batch Prepared Prep Type Туре Method Run Factor Number or Analyzed Analyst Lab Total/NA Prep Distill/CN 293120 09/11/13 07:36 DAM TAL SAV Total/NA Analysis 335.4 1 293439 09/12/13 10:44 DAM TAL SAV Total/NA Prep Distill/Phenol 09/12/13 10:27 JJW TAL SAV 293431 Total/NA Analysis 420.1 293673 09/13/13 10:47 JJW TAL SAV TAL SAV

Client Sample ID: 1360006 Lab Sample ID: 680-94059-8

294041

294378

09/16/13 14:53

09/17/13 19:25

CMP

CMP

TAL SAV

Date Collected: 09/06/13 09:00 Matrix: Water Date Received: 09/10/13 10:32

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293162	09/11/13 09:30	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:47	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:42	CMP	TAL SAV

TestAmerica Savannah

Matrix: Water

Lab Chronicle

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

TestAmerica Job ID: 680-94059-3

Lab Sample ID: 680-94059-9

Matrix: Water

Date Collected: 09/06/13 09:55 Date Received: 09/10/13 10:32

Client Sample ID: 1360007

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Туре	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293162	09/11/13 09:30	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:53	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 19:56	CMP	TAL SAV

Client Sample ID: 1360008 Lab Sample ID: 680-94059-10

Date Collected: 09/06/13 10:40 Matrix: Water

Date Received: 09/10/13 10:32

	Batch	Batch		Dilution	Batch	Prepared		
Prep Type	Type	Method	Run	Factor	Number	or Analyzed	Analyst	Lab
Total/NA	Prep	Distill/CN			293162	09/11/13 09:30	DAM	TAL SAV
Total/NA	Analysis	335.4		1	293439	09/12/13 10:54	DAM	TAL SAV
Total/NA	Prep	Distill/Phenol			293431	09/12/13 10:27	JJW	TAL SAV
Total/NA	Analysis	420.1		1	293673	09/13/13 10:47	JJW	TAL SAV
Dissolved	Filtration	FILTRATION			294041	09/16/13 14:53	CMP	TAL SAV
Dissolved	Analysis	SM 5310B		1	294378	09/17/13 20:14	CMP	TAL SAV

Laboratory References:

TAL SAV = TestAmerica Savannah, 5102 LaRoche Avenue, Savannah, GA 31404, TEL (912)354-7858

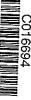
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Log Sheet __i_ of }__





CONTROL ACCOUNTS SAMPLE LOG SHEET & CHAIN OF CUSTODY

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SAMPLE LOG SHEET & CHAIN OF CUSTODY

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TestAmerica Job ID: 680-94059-3

Client: Environmental Monitoring, Inc.

Project/Site: 95.97

Laboratory: TestAmerica Savannah

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
	AFCEE		SAVLAB	
A2LA	DoD ELAP		399.01	07-31-14
A2LA	ISO/IEC 17025		399.01	02-28-15
Alabama	State Program	4	41450	06-30-14
Arkansas DEQ	State Program	6	88-0692	02-01-14 *
California	NELAP	9	3217CA	07-31-14 *
Colorado	State Program	8	N/A	12-31-13
Connecticut	State Program	1	PH-0161	03-31-15
Florida	NELAP	4	E87052	06-30-14
GA Dept. of Agriculture	State Program	4	N/A	12-31-13
Georgia	State Program	4	N/A	06-30-14
Georgia	State Program	4	803	06-30-14
Guam	State Program	9	09-005r	06-17-14
Hawaii	State Program	9	N/A	06-30-14
Illinois	NELAP	5	200022	11-30-13
Indiana	State Program	5	N/A	06-30-14
lowa	State Program	7	353	07-01-15
Kentucky	State Program	4	90084	12-31-13
Kentucky (UST)	State Program	4	18	06-30-14
Louisiana	NELAP	6	30690	06-30-14
Maine	State Program	1	GA00006	08-16-14
Maryland	State Program	3	250	12-31-13
Massachusetts	State Program	1	M-GA006	06-30-14
Michigan	State Program	5	9925	06-30-14
Mississippi	State Program	4	N/A	06-30-14
Montana	State Program	8	CERT0081	01-01-14
Nebraska	State Program	7	TestAmerica-Savannah	06-30-14
New Jersey	NELAP	2	GA769	06-30-14
New Mexico	State Program	6	N/A	06-30-14
New York	NELAP	2	10842	04-01-14
North Carolina DENR	State Program	4	269	12-31-13
North Carolina DHHS	State Program	4	13701	07-31-14
Oklahoma	State Program	6	9984	08-31-13 *
Pennsylvania	NELAP	3	68-00474	06-30-14
Puerto Rico	State Program	2	GA00006	01-01-14
South Carolina	State Program	4	98001	06-30-13 *
Tennessee	State Program	4	TN02961	06-30-14
Texas	NELAP	6	T104704185-08-TX	11-30-13
USDA	Federal		SAV 3-04	04-07-14
Virginia	NELAP	3	460161	06-14-14
Washington	State Program	10	C1794	06-10-14
West Virginia	State Program	3	9950C	12-31-13
West Virginia DEP	State Program	3	94	09-30-13 *
Wisconsin	State Program	5	999819810	08-31-14
Wyoming	State Program	8	8TMS-L	06-30-14

^{*} Expired certification is currently pending renewal and is considered valid.

TestAmerica Savannah